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ABSTRACT

This task-based curriculum guide is intended to help secondary teachers provide relevant training for an entry-level job in communication electronics. Introductory materials include background information on trade and industrial education and program goals and safety information. Descriptions follow of the construction trades program, vocational cooperative education, work experience/unpaid work experience, work experience and career exploration programs, and vocational work study. This job information is then provided: job titles and a task inventory for communication electronics. Tasks are grouped under these five duties: maintaining communications devices, designing equipment and circuitry, servicing communications devices, television maintenance and servicing, and using employability skills. Duty tabs comprise the largest portion of the curriculum guide. Each task in the listing is presented in a one-page format that provides this information: duty, task, achievement indicators, criteria, tools and equipment, and resources. Other components of the curriculum guide include equipment list, a student achievement record, a class achievement record, a glossary of vocational terms, and a list of references. (YLB)

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MICHIGAN TRADE & INDUSTRIAL EDUCATION
CURRICULUM GUIDE

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INTRODUCTION

The Michigan Department of Education, Vocational-Technical Education Service, has adopted descriptions and codes for vocational-technical education programs found in the document entitled, "A Classification of Instructional Programs" (C.I.P.) National Center for Educational Statistics, February, 1981. This new coding system is required of all states in reporting data on all programs receiving funds under P.L. 94-482, the Vocational Education Amendments of 1976.

The current United States Office of Education (U.S.O.E.) coding system was discontinued at the conclusion of the 1981-82 school year. The 1982-83 school year is a transition year from the U.S.O.E. code system to the new C.I.P. Code system.

This Michigan Trade and Industrial Education Curriculum Guide uses the new C.I.P. program description code(s) and lists the entry level job titles associated with the occupational program area by the Dictionary of Occupational Titles (Fourth Edition, 1977), D.O.T. Code, and the Michigan Occupational Information System, (M.O.I.S.), Numerical Index code. NOTE: This information is located under Job Information with program description(s).

PROGRAM DEFINITIONS/GOALS

Vocational Education

The term "vocational education" means organized educational programs which are directly related to the preparation for paid or unpaid employment or for additional preparation for a career requiring other than a baccalaureate or advanced degree.[1]

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[1]The Education Amendments of 1976, Section 195(1), Public Law 94-482.

Goals of Vocational-Technical Education

(1) To provide persons with differing sex, age, racial/ethnic backgrounds, social-economic status, academic disadvantage, economic disadvantage, limited English speaking ability, physical and mental capabilities, and geographical location access to vocational-technical education training or retraining.

(2) To coordinate pre-vocational exploration, career guidance, and placement programs so that each student may make informed and realistic occupational choices and have access to quality placement programs.

(3) To provide all students with learning experiences which are realistic and sufficient in light of their occupational objective.

(4) To insure that all vocational-technical programs will be planned, monitored, and evaluated in light of actual or anticipated employment opportunities and the demand by students for programs related to their abilities and occupational objectives.

Trade and Industrial Education

A vocational education curriculum that includes programs for manufacturing, construction, mechanical service, public service, health service, technical, and fisheries occupations, that prepares a person for entry level employment, upgrading or retraining in a semiskilled or skilled trade, semiprofessional or technical occupation, not generally classified as Agriculture, Distributive, Business or Office, in the Health profession, or Consumer/Home Economics in nature.

NOTE: The occupational clusters found within the scope of trade and industrial education include skilled or semiskilled trade, craft, or occupations which directly relate to the designing, producing, processing, assembling, maintaining, servicing, or repairing of any manufactured product.

TRADE AND INDUSTRIAL EDUCATION STUDENT ORGANIZATION

VICA

The Vocational Industrial Clubs of America (VICA) is the national organization serving trade, industrial, technical, and health occupations students in the United States. VICA incorporates leadership, citizenship, and character

development programs and activities into the skill training offered in America's schools and taught by men and women who have worked in the occupational areas in which they now instruct their students.

VICA emphasizes respect for the dignity of work, high standards in trade ethics, workmanship, scholarship, and safety. VICA promotes understanding of the free enterprise system and encourages development of patriotism through the practice of democracy within the club.

Competitive activities in the trade skills as well as areas such as public speaking, job interview, parliamentary procedure and safety are vital aspects of VICA's program.

TRADE AND INDUSTRIAL EDUCATION CURRICULUM GUIDE

This Michigan Trade and Industrial Education Curriculum Guide is the result of a project funded by the Michigan State Board of Education and the Michigan Department of Education, Vocational-Technical Education Service. The project is located at Michigan State University in the College of Agriculture and Natural Resources' Education Institute (ANREI) and is known as the Curriculum Resource Team.

The project is directed by Dr. Chris M. Olson and Ms. Carol E. Culpepper, Faculty Specialist, Curriculum Resource Team Coordinators. They were responsible for developing the curriculum format and working with a task force leader and committee of individuals from business, industry, and education to ensure the quality of the curriculum. The development of this curriculum was monitored by Melvin France, Secondary Trade and Industrial Education Supervisor.

The names of the occupational task force leader(s) committee members, secretaries, and other support staff are acknowledged after this Introduction.

The occupational program area(s) selected for curriculum development are based on a Vocational-Technical Education Service prioritized program

ranking based on employment demand, State average percent of placement, reimbursed enrollments, the number of programs, and entry level wages within the State of Michigan.

This curriculum guide was developed from the results of a statewide survey and job analysis of incumbent workers in the related occupational areas.

The curriculum guide is representative of the occupational job duty categories which list major activities and tasks performed on an entry level job. The curriculum guide contains a resource list and criteria statements which indicate the minimum standards of performance accepted as evidence of competence in completion of the task by business and industry. This is a task-based curriculum guide which helps a teacher develop a classroom management system where students learn by doing. It is based on task analysis and reflects the skills, knowledge, and attitudes that employers expect incumbent workers to possess.

The curriculum is linked to the labor market, helps the instructor open communication channels with business and industry, and manage classroom instruction where students learn "Need-to-Know" instead of "Nice-to-Know" facts.

This curriculum is adaptable for special needs/handicapped students, helps to validate the program, prepares students for entry level jobs and helps students to make career choices related to job placement.

It is the intent by all those involved in the development of this curriculum guide that it be used to provide relevant training or retraining for employment in the world of work.

The secondary occupational programs/courses in Michigan should meet the following minimum standards to assure soundness and quality of instruction:

(1) The program of instruction must be based on a consideration of the skills and knowledge required in the occupation for which the

instruction is being provided, and includes a planned logical sequence for those essentials of education or experience deemed necessary for the individual to meet an occupational objective.

(2) The program of instruction must be developed and conducted in consultation with a Local Advisory Council/Committee which has an appropriate representation of both sexes and an appropriate representation of racial and ethnic minorities found in the program area, school, and community origin. The local advisory council will advise on current job needs, relevance of programs, and courses in meeting current job needs and consult with the local educational agency in developing program application.

(3) The program of instruction will include the most up-to-date curriculum based on the competencies required in the occupation or occupational field in which the individual is being prepared, upgraded, or updated.

(4) The program of instruction will be sufficiently extensive in duration and intensive within a schedule unit of time to enable the student to develop the necessary knowledge, attitudes, and skills necessary for employment in the occupation or occupational field.

(5) The program of instruction will combine and coordinate related instruction with field, shop, laboratory, cooperative work, or other occupational experience which is appropriate to the vocational objective of the student, is of sufficient duration to develop competencies necessary for employment in the occupation or occupational field, and supervised, directed, or coordinated by a person qualified under the State Plan.

Facilities, equipment, and instructional materials:

(1) Classrooms, libraries, shops, laboratories, and other facilities, including instructional equipment, supplies, teaching aids, and other materials will be adequate in supply and quality to meet the standands approved by the State Board so that such facilities are adequate to enable those who are to be trained to meet the occupational objective for which the education is intended.

(2) If the State Board or local educational agency cannot provide adequate facilities and materials, and such are available in a business or industrial establishment, funds may be used to reimburse the local public educational agency for training programs conducted in private industry when it complies with the training standards and regulations established by the State Board. Such instruction shall be under the supervision and administration of a local public educational agency.

ACKNOWLEDGEMENT

The Michigan Trade and Industrial Curriculum Guide(s) were developed through a series of workshops held throughout the State and at Michigan State University during the 1982-83 school year.

Appreciation is given to all who have contributed their thoughts, time and energy to this curriculum project.

The Michigan Department of Education, Vocational-Technical Education Service, is indebted to the following individuals who were instrumental in the completion of this project and the development of the materials:

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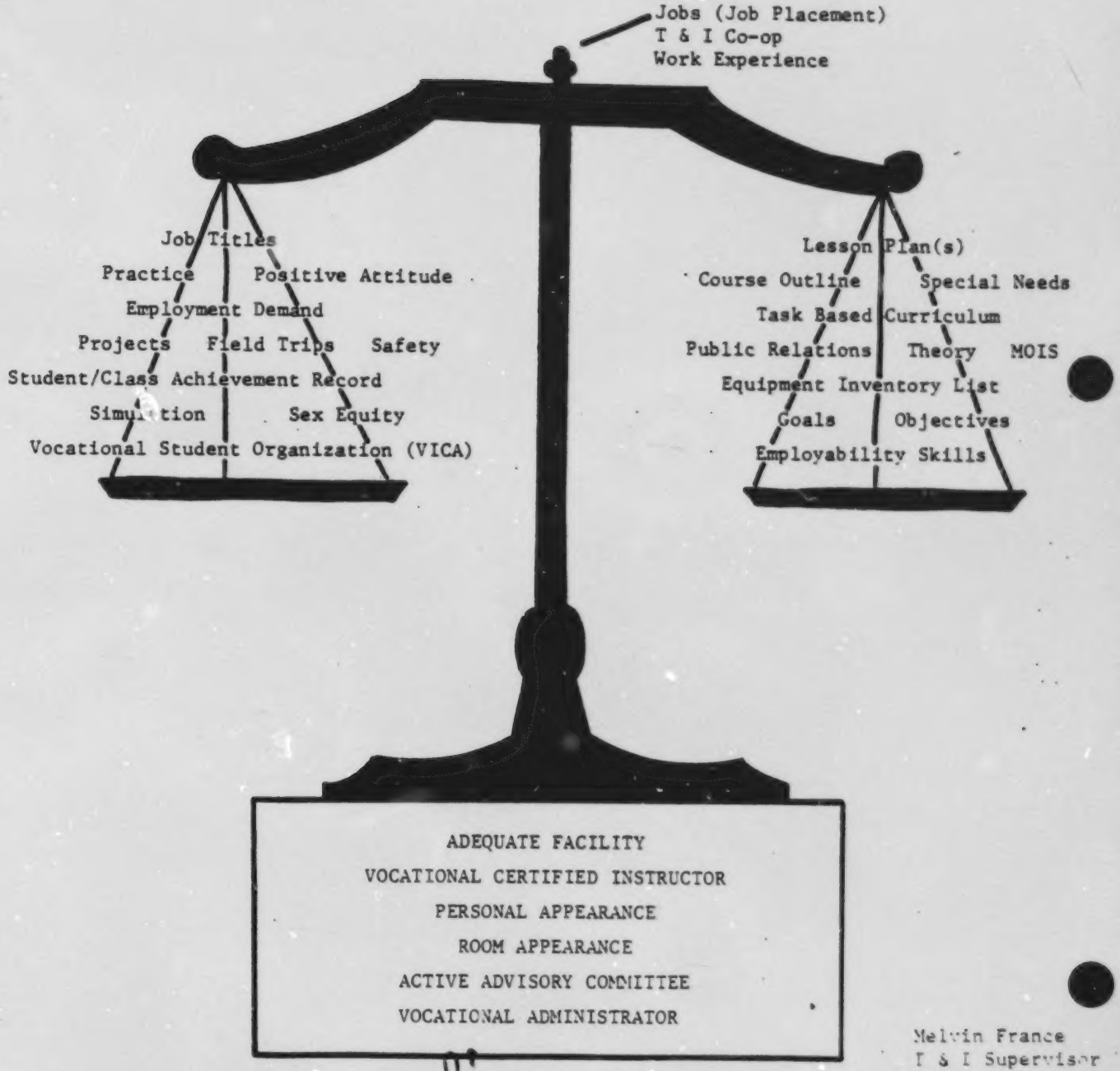
MICHIGAN TRADE AND INDUSTRIAL EDUCATION

IS YOURS A BALANCED PROGRAM?



Melvin France
T & I Supervisor
Secondary Unit

DEPARTMENT OF EDUCATION

STATE BOARD OF EDUCATION

EYE PROTECTIVE DEVICES

Filed with Secretary of State,

These rules take effect 15 days after filing with the Secretary of State

(By authority conferred on the state board of education by section 585a of Act No. 269 of the Public Acts of 1955, as added, being section 340.585a of the Compiled Laws of 1948.)

R 340.1301. Definitions.

Rule 1. As used in these rules:

(a) "Caustic" or "acid" means a material, exclusive of hot water or steam, capable of destroying, eroding or burning of flesh by chemical action.

(b) "Explosive material" means a substance capable of a large-scale, rapid and spectacular expansion which will propel materials in a manner causing injury to the human body.

(c) "Hot liquid" or "solid" means a material having effects that are physically harmful to the eyes.

(d) "Sanitizing" means the disinfecting and cleaning of eye protective devices before use.

(e) "When exposure to eye danger exists" means the exposure when a person is within that distance from sparks, flying particles, rays, molten metal, fumes, glare, glass breakage or chemical splash that such an object or condition could cause damage to his eyes, if he was not using a protective device.

R 340.1302. Educational courses requiring eye protection.

Rule 2. A public educational agency which enrolls students in the following courses when exposure to eye danger exists, shall furnish eye protective devices: vocational or industrial arts shops or laboratories involving the use of or working with hot molten metals, milling, sawing, turning, shaping, grinding, cutting or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicles; caustic or explosive materials; or chemical or combined chemical-physical laboratory work involving acid, caustic or explosive chemicals or hot liquids or solids.

R 340.1303. Standards for devices.

Rule 3. (1) An eye protective device shall meet the following standards based upon the operation involved:

(a) Acetylene burning, acetylene cutting, and acetylene welding operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or welding goggles of coverspec type with tinted plate lenses. This protects against the primary hazards of sparks, harmful rays, molten metal and flying particles.

(b) Chemical handling operations - goggles of flexible fitting with hooded ventilation or face shield with plastic or mesh window. This protects against the primary hazards of splash, acid burns and fumes.

(c) Chipping operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or spectacles of metal frame with sideshields or spectacles of plastic frame with sideshields or spectacles of metal-plastic frame with sideshields or chipping goggles of eyecup type with clear safety lenses or chipping goggles of coverspec type with clear safety lenses. This protects against the primary hazard of flying particles.

(d) Electric (arc) welding operations - welding goggles of coverspec type with tinted plate lenses or welding helmets or welding helmet in combination with tinted lens spectacles. This protects against the primary hazards of sparks, intense rays and molten metal.

(e) Furnace operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or welding goggles of coverspec type with tinted plate lenses. This protects against the primary hazards of glare, heat and molten metal.

(f) Light grinding, machining, and spot welding operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or spectacles of metal frame with sideshields or spectacles of plastic frame with sideshields or spectacles of metal-plastic frame with sideshields or face shield with plastic or mesh window. This protects against the primary hazards of flying particles and sparks.

(g) Heavy grinding operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or chipping goggles of eyecup type with clear safety lenses or chipping goggles of coverspec type with clear safety lenses or in case of severe exposure add face shield with plastic or mesh window. This protects against the primary hazard of flying particles.

(h) Laboratory operations - goggles of flexible fitting with hooded ventilation or face shield in combination with metal or plastic frame spectacles with sideshields. This protects against the primary hazards of chemical splash and glass breakage.

(i) Molten metal operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or face shield in combination with metal or plastic frame spectacles with sideshields and tinted lenses. This protects against the primary hazards of heat, glare, sparks and splash.

(2) The standards described in subrule (1) are taken from the American National Standards Safety Code Z87.1-1968, figure 8, page 28, which is available from the American National Standards Institute, Incorporated, 1430 Broadway, New York, New York 10018, at a cost of $5.00. Applicable excerpts from the American National Standards Safety Code are available at no cost from the Michigan department of education, Lansing, Michigan.

R 340.1304. Sanitization of devices.

Rule 4. An eye protective device shall be sanitized when 2 or more students use the same device, by either:

(a) Washing after each use in warm water and soap or detergent, followed by a rinse in running water.

(b) Placing in a cabinet with ultraviolet light and washing once a week as in subdivision (a).

R 340.1305. Compliance.

Rule 5. (1) A superintendent of a school district shall certify to the intermediate school district superintendent not later than the second week of each school year, on forms prescribed by the Michigan department of education, that eye protective devices meeting the standards of these rules have been obtained. For the school year 1972-73, certification shall be made within 4 weeks after the effective date of these rules. This certification shall also indicate that instructors have been informed that all students, teachers and visitors shall wear the devices when exposure to eye damage exists, as identified in these rules.

(2) An intermediate school district superintendent shall report to the state superintendent of public instruction by October 1 the names of those constituent school districts which are not in compliance with these rules. For the school year 1972-73, the report shall be made within 6 weeks after the effective date of these rules.

(3) The state superintendent of public instruction shall notify a school district in violation of these rules that it shall comply or show cause why compliance cannot be made within 30 days.

ACT NO. 54 OF THE PUBLIC ACTS OF 1972

ENROLLED SENATE BILL NO. 553

AN ACT to amend Act No. 269 of the Public Acts of 1955, entitled "The Michigan School Code", and to repeal certain acts and parts of acts, as amended, being sections 340.1 to 340.984 of the Compiled Laws of 1948, by adding section 585a.

The People of the State of Michigan enact:

Section 1. Act No. 269 of the Public Acts of 1955, as amended, being sections 340.1 to 340.984 of the Compiled Laws of 1948, is amended by adding section 585a to read as follows:

Sec. 585a. (1) Every pupil and teacher participating in a course mentioned in this section shall wear industrial quality eye protective devices, which have been sanitized prior to use, when exposure to danger exists while participating in such course. The board of education shall furnish the devices for pupils, teachers and visitors to the classrooms or laboratories. The courses for which protective devices are required are:

(a) Vocational or industrial arts shops or laboratories involving the use of or working with hot molten metals, milling, sawing, turning, shaping, grinding, cutting or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicle; or caustic or explosive materials.

(b) Chemical or combined chemical-physical laboratory work involving acid, caustic or explosive chemicals or hot liquids or solids.

(2) "Industrial quality eye protective devices" means devices meeting the standards of the american standard safety code for head, eye and respiratory protection, Z87.1-1968, promulgated by the american standards association, incorporated.

(3) The provisions of this section shall be enforced pursuant to rules promulgated by the state board of education in accordance with and subject to Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.315 of the Compiled Laws of 1948.

Section 2. This amendatory act shall take effect September 1, 1972.

The following adapted from the:

NATIONAL STANDARD SCHOOL SHOP SAFETY INSPECTION CHECK LIST

Prepared by the Joint Safety Committee of the
AMERICAN VOCATIONAL ASSOCIATION — NATIONAL SAFETY COUNCIL

_____ Date_____

_____

INTRODUCTION

A safe environment is an essential part of the school shop safety education program. The safe environment will exist only if hazards are discovered and corrected through *regular* and *frequent* inspections by school personnel—administrators, teachers and students. Safety inspections are to determine if everything is satisfactory.

Inspections may be made at the request of the board of education, the school administration or upon the initiative of the teacher. Some communities have drawn upon the cooperative service of professional safety engineers, inspectors of state labor departments, insurance companies and local safety councils to supplement and confirm inspections by school personnel.

The National Standard School Shop Safety Inspection Check List, recommended by the President's Conference on Industrial Safety is an objective inspection procedure for the school shop.

DIRECTIONS

WHO INSPECTS?

This will depend upon local policies. It is recommended, however, that shop teachers, and students—the student safety engineer and/or student safety committee—participate in making regular inspections. This not only tends to share responsibility but stimulates a broader interest in the maintenance of a safe school shop.

WHEN TO INSPECT?

As a minimum, a safety inspection should be made at the beginning of every school term or semester. More *frequent* inspections may be advisable.

HOW TO INSPECT?

Inspections should be well planned in advance.

Inspections should be systematic and thorough. No location that may contain a hazard should be overlooked.

Inspection reports should be clear and concise, but with sufficient explanation to make such recommendation for improvement understandable.

FOLLOW-UP

The current report should be compared with previous records to determine progress. The report should be studied in terms of the accident situation so that special attention can be given to those conditions and locations which are accident producers.

Such unsafe condition should be corrected as soon as possible in accordance with accepted local procedures.

A definite policy should be established in regard to taking materials and equipment out of service because of unsafe conditions.

The inspection report can be used to advantage as the subject for staff and class discussion.

CHECKING PROCEDURE

Draw a circle around the appropriate letter, using the following letter scheme:

S — Satisfactory (needs no attention)
A — Acceptable (needs some attention)
U — Unsatisfactory (needs immediate attention)

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the code number applicable (as B-2).

In most categories, space is provided for listing of standards, requirements or regulations which have local application only.

A. GENERAL PHYSICAL CONDITION

1. Machines, benches, and other equipment are arranged so as to conform to good safety practices..... S A U
2. Condition of stairways..... S A U
3. Condition of aisles..... S A U
4. Condition of floors..... S A U
5. Condition of walls, windows, and ceiling..... S A U
6. Illumination is safe, sufficient, and well placed..... S A U
7. Ventilation is adequate and proper for conditions..... S A U
8. Temperature control..... S A U
9. Fire extinguishers are of proper type, adequately supplied, properly located and maintained..... S A U
10. Teacher and pupils know location of and how to use proper type for various fires..... S A U
11. Number and location of exits is adequate and properly identified..... S A U
12. Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies S A U
13. Lockers are inspected regularly for cleanliness and fire hazards. S A U
14. Locker doors are kept closed..... S A U
15. Walls are clear of objects that might fall..... S A U
16. Utility lines are properly identified..... S A U
17. Teachers know the procedure in the event of fire including notification of the fire department and the evacuation of the building. S A U
18. Air in shop is free from excessive dust, smoke, etc.... S A U
19. _____ S A U
20. _____ S A U
21. _____ S A U
22. _____ S A U
23. Evaluation for the total rating of A. GENERAL PHYSICAL CONDITION..... S A U

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B. HOUSEKEEPING

1. General appearance as to orderliness..... S A U
2. Adequate and proper storage space for tools and materials. S A U
3. Benches are kept orderly..... S A U
4. Corners are clean and clear..... S A U
5. Special tool racks, in orderly condition, and provided at benches and machines..... S A U
6. Tool, supply, and/or material room is orderly..... S A U
7. Sufficient scrap boxes are provided..... S A U
8. Scrap stock is put in scrap boxes promptly..... S A U
9. Materials are stored in an orderly and safe condition.. S A U
10. A spring lid metal container is provided for waste and oily rags. S A U
11. All waste materials and oily rags are promptly placed in the containers..... S A U
12. Containers for oily rags and waste materials are frequently and regularly emptied..... S A U
13. Dangerous materials are stored in metal cabinets..... S A U
14. Machines have been color conditioned..... S A U
15. Safety cans are provided for flammable liquids..... S A U
16. Bulk storage of dangerous materials is provided outside of the main building..... S A U
17. A toe-board or railing around a mezzanine used for storage or washing facilities..... S A U
18. Materials are stored in an orderly and safe condition on this mezzanine..... S A U
19. Flammable liquids are not used for cleaning purposes S A U
20. Floors are free of oil, water and foreign material..... S A U
21. Floors, walls, windows, and ceilings are cleaned periodically. S A U
22. _____ S A U
23. _____ S A U
24. _____ S A U
25. _____ S A U
26. Evaluation for the total rating for B. HOUSEKEEPING S A U

C. EQUIPMENT

1. Machines are arranged so that workers are protected from hazards of other machines, passing students, etc..... S A U
2. Danger zones are properly indicated and guarded..... S A U
3. All gears, moving belts, etc., are protected by permanent enclosure guards..... S A U
4. All guards are used as much as possible..... S A U

C. EQUIPMENT (continued)

5. All equipment control switches are easily available to operato
6. All machines are "locked off" when instructor is out of the ro S A
7. Brushes are used for cleaning equipment..... S A
8. Nonskid areas are provided around machines..... S A
9. Machines are in safe working condition..... S A
10. Machines are guarded to comply with American Standards As sociation and local state code..... S A
11. Adequate supervision is maintained when students are using ma chines and dangerous tools..... S A
12. Tools are kept sharp, clean and in safe working order S A
13. All hoisting devices are in safe operating condition... S A
14. Machines are shut off while unattended..... S A
15. Adequate storage facilities for tools, equipment, etc., not in im mediate use..... S A
16. _____ S A
17. _____ S A
18. _____ S A
19. _____ S A
20. Evaluation for the total rating for C. EQUIPMENT.. S A

D. ELECTRICAL INSTALLATION

1. All switches are enclosed..... S A
2. There is a master control switch for all of the electrical installa tions..... S A
3. Electrical outlets and circuits are properly identified.. S A
4. All electrical extension cords are in safe condition and are no carrying excessive loads..... S A
5. All machine switches are within easy reach of the operators. S A
6. Electrical motors and equipment are wired to comply with the National Electric Code..... S A
7. Individual cut-off switches are provided for each machine. S A
8. Machines are provided with overload and underload controls by magnetic pushbutton controls..... S A
9. No temporary wiring in evidence..... S A
10. _____ S A
11. _____ S A
12. _____ S A
13. _____ S A
14. Evaluation for the total rating for D. ELECTRICAL IN STALLATION.....

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E. GAS

1. Gas flow to appliances is regulated, so that when appliance valve is turned on full, the flames are not too high..... S A U

2. Gas appliances are properly insulated with asbestos or other insulating material from tables, benches, adjacent walls, or other flammable materials ..... S A U

3. No gas hose is used where pipe connections could be made. S A U

4. Gas appliances have been adjusted so that they may be lighted without undue hazard..... S A U

5. Students have been instructed when lighting gas appliances to light the match first before turning on the gas..... S A U

6. There are no gas leaks, nor is any odor of gas detectable in any part of the shop..... S A U

7. Shop instruction has been given concerning the lighting of gas furnaces operating with both air and gas under pressure.. S A U

8. When lighting the gas forge, goggles are worn..... S A U

9. When lighting the gas furnace, the following procedure is used: (a) light the match; (b) turn on the gas; (c) drop the match in the hole in top of the furnace..... S A U

10. In shutting down the gas furnace, the gas valve is closed before the air valve..... S A U

11. _____ S A U

12. _____ S A U

13. _____ S A U

14. _____ S A U

15. Evaluation for the total rating for E. GAS..... S A U

F. PERSONAL PROTECTION

1. Goggles or protective shields are provided and required for all work where eye hazards exist..... S A U

2. If individual goggles are not provided, hoods and goggles are properly disinfected before use..... S A U

3. Shields and goggles are provided for electric welding.. S A U

4. Rings and other jewelry are removed by pupils when working in the shop..... S A U

5. Proper kind of wearing apparel is worn and worn properly for the job being done..... S A U

6. Leggings, safety shoes, etc., are worn in special classes such as foundry, etc., when needed..... S A U

7. Respirators are provided for dusty or toxic atmospheric conditions such as when spraying in the finishing room..... S A U

8. Provisions are made for cleaning and sterilizing respirators. S A U

9. Students are examined for safety knowledge ability.. S A U

10. Sleeves are rolled above elbows when operating machines. S A U

11. Clothing of students is free from loose sleeves, flopping ties, loose coats, etc. ..... S A U

12. _____ S A U

F. PERSONAL PROTECTION (continued)

13. _____ S A U

14. _____ S A U

15. _____ S A U

16. Evaluation for the total rating for F. PERSONAL PROTECTION. S A U

G. INSTRUCTION

1. Shop Safety is taught as an integral part of each teaching unit. S A U

2. Safety rules are posted particularly at each danger station. S A U

3. Printed safety rules are given each student..... S A U

4. Pupils take a safety pledge..... S A

5. Use of a safety inspector..... S A U

6. Use of a student shop safety committee..... S A U

7. Use of safety contests..... S A U

8. Motion and/or slide films on safety are used in the instruction. S A U

9. Use of suggestion box..... S A U

10. Use of safety tests..... S A U

11. Use of safety posters..... S A U

12. Talks on safety are given to the classes by industrial men. S A U

13. Tours are taken of industrial plants as a means of studying safety practices ..... S A U

14. Periodic safety inspections of the shop are made by a student committee ..... S A U

15. Men from industry make safety inspections of the shop S A U

16. Student shop safety committee investigates all accidents S A U

17. A proper record is kept of safety instructions which are given, preferably showing the signature of student on tests given in this area ..... S A U

18. Rotate students on the Shop Safety Committee so that as many students as possible have an opportunity to participate... S A U

19. _____ S A U

20. _____ S A U

21. _____ S A U

22. _____ S A U

23. Evaluation for the total rating of G. INSTRUCTION S A U

H. ACCIDENT RECORDS

1. There is a written statement outlining the proper procedure when and if a student is seriously hurt..... S A U

2. Adequate accident statistics are kept..... S A U

3. Accidents are reported to the proper administrative authority by the instructor ..... S A U

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H. ACCIDENT RECORD (continued)

4. A copy of each accident report is filed with the State Department of Education ..... S A U

5. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards..... S A U

6. _____ S A U

7. _____ S A U

8. _____ S A U

9. _____ S A U

10. Evaluation for the total rating of H. ACCIDENT RECORDS. S A U

I. FIRST AID

1. An adequately stocked first aid cabinet is provided.. S A

2. The first aid is administered by a qualified individual S A

3. The school has individuals qualified to administer first aid. S A

4. _____ S A

5. _____ S A

6. _____ S A

7. _____ S A

8. Evaluation for the total rating of I. FIRST AID.... S A

RECOMMENDATIONS

Code No.

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Rep. 10M57801

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21

47.0103 Communications

An approved instructional program that prepares individuals to assemble, install, operate, maintain, and repair one- and two-way communications equipment and systems, including AM and FM radio, television, hearing aids, and other electronic communication devices, or systems. Includes instruction in using actual equipment or educational trainers, in various types of equipment, motors, mechanical devices, power suppliers, amplifiers, and digital circuitry; the use of testing equipment; and Federal Communications Commission (FCC) licensing requirements.

VOCATIONAL COOPERATIVE EDUCATION

Definition

"The term 'cooperative education' means a program of vocational education for persons who, through written cooperative arrangements between the school and employers, receive instruction, including required academic courses and related vocational instruction by alternation of study in school with a job in any occupational field, but these two experiences must be planned and supervised by the school and employers so that each contributes to the student's education and to his or her employability. Work periods and school attendance may be on alternate half days, full days, weeks, or other periods of time in fulfilling the cooperative program." (P.L. 94-482)

Responsibilities of School District

The local school district must meet all the Federal requirements of P.L. 94-482, Section 122; 45 CFR 104.531 through 104.533 and the State of Michigan Statutes and General School Laws listed below:

A. IT IS A PROGRAM OF VOCATIONAL EDUCATION.

"Vocational program" means laboratory, simulation or instruction based upon individually designed learning experiences in a vocational subject preparing the student for competencies required in a recognized occupation coded in accordance with the most recent vocational education listing of programs by the United States Department of Education.

B. THERE IS A WRITTEN AGREEMENT BETWEEN THE SCHOOL AND EMPLOYERS.

The Youth Employment Standards Act (P.A. 90 of 1978) governs the legal employment of minors in Michigan. In section 18 of the Act, a provision is made to allow a written agreement, or contract, to be entered into between an employer and the board of education of the school district, in which the minor is enrolled. This written agreement exempts a student from obtaining a work permit and allows the student to be legally employed in Michigan. The employment, however, shall not be in violation of a Federal Statute or regulation and a signed copy of the agreement shall be on file in the place of employment before a minor begins employment. The training agreement, in cooperative education, is the legal written agreement developed cooperatively between the employer, teacher-coordinator, student, and parent and outlines the responsibilities of the employer and student to the program and establishes the legal conditions of the student-learner's employment.

C. THERE IS INSTRUCTION (INCLUDING REQUIRED ACADEMIC INSTRUCTION) IN SCHOOL RELATED TO THE JOB IN ANY OCCUPATIONAL AREA.

The program is of sufficient duration to develop competencies necessary to prepare the learner for employment. It provides a coordinated instructional program combining supervised part-time employment and

classroom instruction related to the learner's job. Related vocational instruction for cooperative education enrollees shall be scheduled weekly.

D. THE ALTERNATION OF STUDY AND WORK ARE PLANNED AND SUPERVISED BY THE SCHOOL AND EMPLOYER IN ORDER TO FURTHER THE STUDENT'S EDUCATION AND EMPLOYABILITY.

The student-learner shall be employed for an average of not less than 15 hours per week during the effective time of the individual's program. The school shall have the responsibility of providing coordination and supervision services during such time.

E. STUDENTS ARE EMPLOYED AND COMPENSATED IN CONFORMITY WITH FEDERAL, STATE AND LOCAL LAWS.

The program provides cooperative on-the-job training that (1) employs and compensates student-learners in conformity with Federal, State, and local laws and regulations and in a manner not resulting in exploitation of the student-learner for private gain, and (2) is conducted in accordance with written training agreements between local education agencies and employers.

References

Individuals requiring additional information pertaining to cooperative education principles and practices are asked to consult the Michigan Department of Education, Vocational-Technical Education Service, developed Cooperative Education Handbook available in September of 1981.

WORK EXPERIENCE

PAID WORK EXPERIENCE

Definition

Paid work experience programs are school-sponsored and supervised employment programs. Students are allowed to earn academic credit while employed in the community. The employment serves as a means of acquiring desirable work habits and attitudes towards the world of work. The employment is not necessarily related to a student's career interest and enrollment in a related vocational education program is not required.

Objectives

Paid work experience programs are designed to provide students an opportunity to:

1. Foster positive attitudes about work, school and society
2. Promote an understanding in the dignity of work
3. Develop a student's ability to understand and function in an employer-employee relationship
4. Earn wages to remain in school
5. Experience an alternative to the traditional school program

Guidelines

1. Written work agreements should be completed between the employer, student, parent and school
2. Written work agreements should be completed in conformance to all Federal, State and local laws, rules and regulations; including non-discrimination against any student because of race, color, sex, national origin or ancestry. This policy of non-discrimination shall also apply to otherwise qualified handicapped individuals
3. Related academic instruction, where possible, should be provided
4. A school work experience coordinator should be provided to serve as a liaison between the student, employee, parents and school officials
5. Academic credit should be awarded for participation in the program

Funding

The Michigan Department of Education, the Vocational-Technical Education Service does not fund paid work experience programs.

UNPAID WORK EXPERIENCE

Definition

Unpaid work experience is a school sponsored and supervised instructional technique used in vocational education programs in which students are placed with an employer for a limited time and are not compensated during the duration of the experience.

Objectives

Unpaid work experience programs are designed to provide students with an opportunity to:

1. Receive on-site exposure to various businesses and industries while participating in a related vocational education program
2. Develop a realistic understanding of the relationship between education and the world of work
3. Enhance a positive self-image
4. Assist in the selection of occupational choices
5. Expand learning opportunities by using community resources

Guidelines

1. The training, even though it includes actual operation of the facilities of the participating employer is similar to that given in a vocational school
2. The training is for the benefit of the trainee
3. The trainee does not displace a regular employee, but does work under a regular employee's close observation
4. The participating employer does not derive an immediate advantage from the activities of the trainee
5. The trainee is not necessarily entitled to a job at the conclusion of the training period
6. The trainee is not entitled to wages for the time spent in the training
7. The training is for not more than 45 hours with a participating employer during each school semester
8. The training is conducted under a written work experience training agreement between the school district and the participating employer

Funding

The Michigan Department of Education, the Vocational-Technical Education Service does not fund unpaid work experience but considers it to be an allowable instructional activity under a given vocational education program.

WORK EXPERIENCE AND CAREER EXPLORATION PROGRAM (W.E.C.E.P.)

I. Definition

The Work Experience and Career Exploration Program (W.E.C.E.P.) is a school-supervised and administered program that includes part-time work as an integral part of an educational program aimed at motivating 14 and 15 year-old youth toward education and preparing them for the world of work.

II. Program Objectives

There are several objectives of a W.E.C.E.P. program:

A. To provide a career-oriented educational program for dropout prone youth to become oriented and motivated toward education and the world of work.

B. To increase the desire to learn and improve educational performance.

C. To develop a greater degree of self-confidence, responsibility and aid in the maturation process of the student participants.

D. To provide student participants with on-the-job learning experiences that are in harmony with their interests, needs and objectives.

E. To improve school adjustment of student participants for whom the traditional curriculum is found to be inadequate.

F. To promote personal and social adjustment of the student participants and establish emotional stability through a feeling of being engaged in worthwhile activity.

III. Instructional Content

W.E.C.E.P. programs are planned so as to include part-time work supervised by employers and school personnel, as an integrated part of the enrollee's educational program. Students receive work experience on jobs permitted or approved under Federal or State laws. Students are in class with a W.E.C.E.P. teacher-coordinator for job-related and occupational safety, including needed individualized or remedial instruction. Students also receive a minimum of 20 hours of instruction on the Michigan Occupational Information System (MOIS) and a minimum of 30 hours of employability skills instruction. The students' employment is under the supervision of W.E.C.E.P. teacher-coordinators and employers. Students receive all State required courses necessary for graduation. The W.E.C.E.P. program is planned so that the students' individual academic achievement potential is recognized.

IV. Program Organization

The Vocational-Technical Education Service, Michigan Department of Education requires that W.E.C.E.P. programs in local districts meet the following criteria:

A. Eligibility. Any student aged 14 or 15 years, whom authoritative local school personnel identify as being able to benefit from the program, shall be eligible to participate.

B. Credits. Students shall receive school credits for both in-school related instruction and on-the-job experience.

C. Size. Each program unit shall consist of 12 to 25 students to one W.E.C.E.P. teacher-coordinator.

D. Instructional Schedule. W.E.C.E.P. students will spend a minimum of four periods daily in classroom instruction including one period of 180 hours of instruction devoted to job-related and employability skill instruction, safety and career exploration. Each student will have a minimum of 20 hours of career exploration utilizing the Michigan Occupational Information System (MOIS) and have a minimum of 30 hours of instruction in employability skills training. The employability skills training will equal or exceed the employability skills performance objectives adopted, as part of Michigan Vocational-Technical Service programs. Each local district submitting a letter of application to operate a W.E.C.E.P. program will furnish to the Vocational-Technical Education Service a course outline for the related class.

E. W.E.C.E.P. Teacher-Coordinator. Each program unit shall be under the supervision of a school official to be designated for the purpose of the program as a W.E.C.E.P. teacher-coordinator, who shall generally supervise the program and coordinate the work and education aspects of the program and make regularly scheduled visits to the work stations.

F. Written W.E.C.E.P. Training Agreement. No student shall participate in the program until there has been made a written E.E.C.E.P. training agreement signed by the W.E.C.E.P. teacher-coordinator, the employer and the student. The agreement shall also be signed or otherwise consented to by the student's parent or guardian. The W.E.C.E.P. training agreement will detail job tasks and related in-school instruction. A sample W.E.C.E.P. training agreement will be submitted annually by the local district to the Vocational-Technical Education Service.

G. Provision for Health and Well-Being. Employment under W.E.C.E.P. will not interfere with the schooling of the minors or with their health and well-being.

H. Records and Reports. The names and addresses of each school and the names and addresses of each employer enrolling work experience and career exploration program students and the number of enrollees in each unit shall be kept at the Vocational-Technical Education Service's office. A copy of the written W.E.C.E.P. training agreement for each student participating in the program shall be kept in the local educational office. The records required (for this paragraph) shall be kept for a period of three years from the date of enrollment in the program and shall be made available for inspection or transcription to the representatives of the Administrator of the Wage and Hour Division. Each school district operating a W.E.C.E.P. program shall submit an annual evaluative report by June 30th, which details the results of the W.E.C.E.P. program in terms of attendance and tardiness patterns, grade point average trends and dropout statistics of the enrollees. Based on a favorable state agency evaluation, a local district will be approved on an annual basis to operate a W.E.C.E.P. program. Under no circumstances can a local district operate a W.E.C.E.P. program without first obtaining written state agency approval for the program.

I. Approved Occupations. Employment of minors enrolled in a W.E.C.E.P. program approved pursuant to the requirements of this section shall be permitted in all occupations except the following:

1. Manufacturing and mining.

2. Occupations declared to be hazardous for the employment of minors between 16 and 18 years of age in Subpart E of Part 570 Child Labor Regulations, Orders and Statements of Interpretation of the Federal Fair Labor Standards Act, and occupations in agriculture declared to be hazardous for employment of minors below the age of 16 in Subpart E-1 of this part.

3. Occupations other than those permitted under sections 570.33 and 570.34 except upon approval of a variation in individual cases or classes of cases by the Administrator of the Wage and Hour Division after notice to interested persons and opportunity to be heard.

Employment of minors enrolled in a W.E.C.E.P. program approved pursuant to the requirements of this section shall be confined to not more than 23 hours in any week when school is in session and not more than three hours in any day when school is in session, any portion of which may be during school hours.

Employment of W.E.C.E.P. participants must not have the effect of displacing a worker in the establishment of the employer. Participants in W.E.C.E.P. must be paid according to the statutory minimum wage provision of the Fair Labor Standards Act.

V. Approval of Local Programs

Local school districts desiring approval to operate a W.E.C.E.P. program must submit an annual letter of application by June 30th to the

Michigan Department of Education
Vocational-Technical Education Service
Secondary Unit
Box 30009
Lansing, MI 48909
(517) 373-3365

VOCATIONAL WORK-STUDY

Definition and Purpose

The vocational work-study program is for those students who are in need of earnings from employment in order to commence or continue their vocational education programs.

Administration

The work-study program shall be administered by local educational agencies and made available, to the extent of available funds, to all qualified youth, in the area served by such agencies, who meet requirements.

Eligible Students

Employment under the work-study program shall be furnished only to a student who (a) has been accepted for enrollment or, if already enrolled, is in good standing and in full time attendance as a full-time student in a vocational education program which meets the standards of the state board and of the local educational agency and the requirements of the state plan, (b) is in need of the earnings from such employment to commence or continue a vocational education program, and (c) is at least 15 years of age and less than 21 years of age at the date of commencement of employment and is capable in the opinion of the appropriate school authorities of maintaining good standing in a school program while employed under the work-study program.

Limitation of Hours and Compensation of Employment

No student shall be employed under a vocational work-study program for more than 20 hours in any week in which classes in which the student is enrolled are in session. Summer employment shall not exceed 40 hours per week.

Employers

Employment under work-study programs shall be for the local educational agency or for some other public agency or institution, federal, state, or local and work so performed shall be adequately supervised and coordinated and shall not supplant present employees of such agency or institution who ordinarily perform such work. In those instances where employment under work-study programs is for a federal agency or institution, the written arrangement between the local educational agency and the federal agency or institution shall state that students so employed are not federal employees for any purpose.

Amounts Spent for Employment

In each fiscal year during which the work-study program remains in effect, the local educational agency shall expend for employment of its students an amount in state and/or local funds that is not less than the average annual expenditure for work-study programs of a similar nature during the three fiscal years preceding in which the supplementary plan provisons for its work study program are approved.

Applications, Priorities, and Approval

Work-study programs shall be approved on an individual basis by the state board and shall be consistent with the policies and procedures set forth.

Applications by Local Educational Agencies

Local educational agencies shall submit project proposals to the state board staff for approval in a manner similar to other vocational education programs.

Priority of Projects

Work-study programs will be provided, insofar as financial resources are available, for the undertaking of such programs in the order determined by the application of criteria for determining relative priority of projects which shall include preference for local educational agencies serving communities having substantial numbers of dropouts and unemployed youths and may include other relevant factors such as the extent to which the local educational agencies are using guidance and counseling and other related services designed to achieve the purposes of the work-study program.

COMMUNICATION ELECTRONICS
JOB TITLES

D.O.T.	JOB TITLE
710.281-038	Taximeter Repairer
828.261-010	Electronic Organ Technician
823.261-010	Public-Address Servicer
720.281-018	Television and Readio Repairer
828.281-022	Radioactivity Instrument Maintenance Technician
829.281-022	Sound Technician
720.281-010	Radio Repairer
720.687-014	Record Changer
720.281-014	Tape Recorder Repairer
726.684-018	Electronics Assembler
828.251-010	Electronic Sales Service Technician
823.261-018	Radio Mechanic
193.262-034	Radiotelephone Operator
194.262-038	Transmitter Operator
194.362-018	Telecine Operator
194.282-010	Video Operator
Not Available	Video Game Repairer

DUTY/TASK - JOB MATRIX

TASK LIST FOR
COMMUNICATION ELECTRONICS

A. MAINTAINING COMMUNICATIONS DEVICES

1. Adjust/align a transmitter output using appropriate test equipment and hand tools to meet manufacturer's and/or FCC specification.

2. Align a RF oscillator using appropriate test equipment and tools to achieve a proper output signal.

3. Align frequency multiplier stage using proper test equipment and tools to obtain a proper output signal.

4. Align a RF driver stage using proper test equipment and tools to obtain a proper output signal.

5. Align a RF output amplifier using proper test equipment to obtain a proper output signal.

6. Align an IF stage using proper test equipment and tools to obtain a proper output signal.

7. Align a FM discriminator stage using proper test equipment and tools to obtain a proper signal output.

8. Clean potentiometer controls using a proper solvent to obtain nondistorted, noise free operation.

9. Clean/lubricate all mechanical drive components using accepted procedures and chemicals to obtain normal operation.

10. Clean air filters with proper equipment to remove any contaminants which may affect proper operation.

11. Clean chassis with proper equipment to remove any contaminants which may affect proper operation.

12. Clean circulation fans with proper equipment to remove any contaminants which may affect proper operation.

13. Adjust appropriate section of a modulator stage using proper test equipment and tools to ascertain that the output signal does not exceed 100% modulation.

14. Adjust circuit supply voltages using proper test equipment and tools to achieve proper operation.

A. MAINTAINING COMMUNICATIONS DEVICES (continued)

15. Align a Monostable IC Circuit for proper delay time using appropriate test equipment and hand tools to assure proper operation of the circuit.

16. Adjust/align, HF, VHF, UHF antenna using appropriate test equipment, procedures, and hand tool to assure that the standing wave ratio (SWR) meets manufacturer's specifications.

B. DESIGNING EQUIPMENT AND CIRCUITRY

1. Construct a transistor electronic circuit from a schematic, using proper tools, components, and test equipment, to obtain an operational circuit.

2. Design a digital logic truth table using operational parameters to meet specifications required.

3. Design and construct a digital logic circuit using a truth table to obtain the circuit operation desired.

4. Design and construct an I.C. operational amplifier circuit using operational parameters given by the manufacturer to obtain the circuit operation desired.

C. SERVICING COMMUNICATIONS DEVICES

1. Test and replace if necessary voltage input components to a transmitter or receiver using appropriate test equipment and hand tools to assure proper operation.

2. Test and replace if necessary an integrated circuit (IC) chip used in an RF oscillator using appropriate test equipment and hand tools to assure proper operation of the oscillator circuit.

3. Test and replace if neccessary an integrated circuit chip used in a frequency multiplier using appropriate test equipment and hand tools to assure the proper operation of the circuit.

4. Test and replace if necessary an integrated circuit chip used in a modulator using appropriate test equipment and hand tools to assure proper operation of the circuit.

5. Test and replace if necessary an integrated circuit chip used in a Phase-Lock Loop Circuit using appropriate test equipment and hand tools to assure proper operation of the circuit.

6. Test and replace if necessary an integrated circuit digital chip of the 7400 series family using appropriate test equipment and hand tools to assure proper operation of the circuit.

C. SERVICING COMMUNICATIONS DEVICES (continued)

7. Test and replace if necessary, a C-MOS integrated circuit chip utilized in a digital circuit using appropriate test equipment procedures, and hand tools to assure proper operation of the circuit.

8. Test and replace if necessary a digital display segment using appropriate test equipment and hand tools to assure proper operation of the unit.

9. Test and replace if necessary a CRT deflection yoke using appropriate test equipment and hand tools to assure proper operation of the unit.

10. Test and replace if necessary a microphone using appropriate test equipment and hand tools to assure proper operation of the unit.

11. Test and replace if necessary a monostable integrated circuit chip using appropriate test equipment and hand tools to assure proper operation.

12. Test and replace if necessary a photo-electric relay using appropriate test equipment and hand tools to assure proper operation of the unit.

13. Test and replace if necessary Selsyn Unit of a Servomechanism using appropriate test equipment and hand tools to assure proper operation of the unit.

14. Test and replace if necessary a magnetic tape head using appropriate test equipment and hand tools to assure proper operation of the unit.

15. Test and replace if necessary a Transducer using appropriate test equipment and hand tools to assure proper operation of the unit.

16. Test and replace if necessary UHF coaxial connectors of various types using appropriate test equipment, procedures, and hand tools to assure proper operation of its functional purpose.

17. Repair audio output transformer, using necessary test equipment and hand tools, to restore the unit to proper operation.

18. Repair change switch using necessary test equipment and hand tools, to restore the unit to proper operation.

19. Repair speaker using necessary test equipment and hand tools, to restore the unit to proper operation.

20. Replace auto radios, using necessary tools to provide car radio operation.

21. Check/replace volume control using necessary test equipment and hand tools, to restore the unit to proper operation.

C. SERVICING COMMUNICATIONS DEVICES (continued)

22. Check/replace tuning capacitor using necessary test equipment and hand tools, to restore the unit to proper operation.

23. Check/replace electron tubes using necessary test equipment and hand tools, to restore the unit to proper operation.

24. Check/repair/replace electron tube sockets using necessary test equipment and hand tools, to restore the unit ot proper operation.

25. Check/replace transistor sockets using necessary test equipment and hand tools, to restore unit to proper operation.

26. Check/replace transistors using necessary test equipment and hand tools, to restore unit to proper operation.

27. Check/replace tone control using necessary test equipment and hand tools, to restore unit to proper operation.

28. Check/repair/replace earphone/earplug using necessary test equipment and hand tools, to restore unit to proper operation.

29. Adjust record player stylus pressures using necessary test equipment and hand tools, to restore the unit to proper operation.

30. Clean/lubricate record changer using necessary equipment and hand tools, to restore the unit to proper operation.

31. Operate equipment using necessary test equipment and hand tools, to achieve proper utilization of equipment.

32. Check/replace capacitors, using necessary test equipment and hand tools, to restore unit to proper operation.

33. Check/replace on-off switch, using necessary test equipment and hand tools, to restore unit to proper operation.

34. Check/replace IF transformer, using necessary test equipment and hand tools, to restore unit to proper operation.

35. Check/replace dial light, using necessary test equipment and hand tools,to restore unit to proper operation.

36. Check and replace dial cord, using necessary test equipment and hand tools to restore unit to proper operation.

37. Check/repair/replace case or cabinet, using necessary test equipment and hand tools, to restore unit to proper operation.

C. SERVICING COMMUNICATIONS DEVICES (continued)

38. Check/replace battery holders, using test equipment and hand tools, to restore unit to proper operation.

39. Check/replace batteries, using necessary test equipment and hand tools, to restore unit to proper operation.

40. Check/replace resistors, using necessary test equipment and hand tools, to restore unit to proper operation.

D. TELEVISION MAINTANENCE AND SERVICING

1. Analyze waveforms of keying pulse to blanker using oscilloscope and necessary hand tools to gain proficiency in waveform analysis.

2. Analyze waveforms of gating pulse to burst amplifier using oscilloscope and necessary hand tools to gain proficiency in waveform analysis.

3. Analyze output waveform of red domodulator using an oscilloscope and proper hand tools, to gain proficiency in waveform analysis.

4. Analyze output waveform of 3.58 MHZ oscillator using oscilloscope and proper hand tools, to gain proficiency in waveform analysis.

5. Analyze output waveform of green domodulator using oscilloscope and proper hand tools, to gain a proficiency in waveform analysis.

6. Analyze output waveform of blue domodulator using oscilloscope and proper hand tools to gain a proficiency in waveform analysis.

7. Analyze waveform output of bandpass amplifier, using oscilloscope and proper hand tools to gain a proficiency in waveform analysis.

8. Analyze input waveform to phase detector using oscilloscope and necessary hand tools to gain a proficiency in waveform analysis.

9. Analyze input waveform to color demodulators using oscilloscope and necessary hand tools to gain a proficiency in input waveform analysis.

10. Analyze color problems by viewing a color television program using any required material to gain proficiency in visual troubleshooting.

11. Analyze a color problem using the color dot-bar generator and the proper hand tools to restore unit to proper operation.

12. Analyze burst output waveform using proper test equipment and hand tools to restore unit to proper operation.

D. TELEVISION MAINTENANCE AND SERVICING (continued)

13. Remove the television chassis from cabinet using necessary equipment and hand tools to ready unit for proper service testing.

14. Pick-up/deliver a television set using required invoices to achieve a business-like transaction.

15. Call a customer, using proper procedures, to acquire necessary information to complete transaction.

16. Complete a service invoice, listing all the required information, to complete a transaction to the satisfaction of customer and management.

17. Present an invoice to a customer, using proper procedures, to collect for services.

18. Clean television cabinet, using necessary materials and hand tools to restore unit to original condition.

19. Check all customer controls for proper operation, using necessary test equipment and hand tools to restore unit to proper operation.

20. Adjust all television service controls using necessary test equipment and hand tools to achieve proper operation of unit.

21. Prepare maintenance reports, using necessary data and equipment to achieve recommended level of reporting and recordkeeping.

22. Monitor a safety program using necessary materials to achieve a recognized level of worker safety.

23. Maintain required data records using necessary journals and material to achieve required level of accountability.

24. Analyze audio symptoms to isolate defective stage.

25. Clean/replace volume control using appropriate tools and equipment to restore unit to proper operation.

26. Align sound IF section using appropriate tools and equipment to restore unit to proper operation.

27. Adjust color killer control using necessary test equipment and hand tools to restore unit to proper operation.

28. Repair the television ACC circuit using necessary test equipment and tools to restore unit to proper operation.

D. TELEVISION MAINTENANCE AND SERVICING (continued)

29. Degauss color television set using necessary test equipment and hand tools to restore unit to proper operation.

30. Perform a complete color convergence using appropriate tools and equipment to restore unit to proper operation.

31. Perform a complete purity set up using appropriate tools and equipment to restore unit to proper operation.

32. Analyze picture problems from video display using necessary hand tools to restore unit to proper operation.

33. Clean VHF tuner using approved cleaner/lubricants and necessary hand tools to restore tuner to proper operation.

34. Replace VHF tuner using necessary test equipment and proper hand tools to restore TV set to proper operation.

E. USING EMPLOYABILITY SKILLS

1. Investigate employment information using sources of employment information to identify employment opportunities.

2. Identify job requirements using health, physical, legal, education, and other occupational information to determine the requirements of an occupation.

3. Acquire wage information using available resources to determine the approximate entry wages, general wage range, and significant fringe benefits for an occupation.

4. Identify significant non-wage job characteristics using available resources to determine shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment and other significant job factors.

5. Explore employment opportunities using available resources to describe local, regional, and national employment opportunities for an occupation.

6. Analyze career ladder using available resources to describe job progression in an occupation.

7. Identify personal criteria with information about available alternatives using a decision-making situation and procedures and skills in decision-making to choose a job, further training or other alternatives.

8. Prepare a resume using personal information to apply for a job.

E. USING EMPLOYABILITY SKILLS (continued)

9. Write a letter of application using personal notes to apply/inquire about a job.

10. Complete a job application using personal notes to apply for a job.

11. Demonstrate appropriate dress using a knowledge of job requirements to comply with standards of on-the-job dress and grooming.

12. Complete a job interview using communication and interpersonal skills to become employed.

13. Describe personal criteria using references to identify acceptable job offers.

14. Demonstrate interpersonal skills to achieve successful relationships with others.

15. Identify source of continuing education for an occupation using available resources to identify career ladder alternatives.

16. Describe job termination procedures using a knowledge of the occupational area to leave a particular job.

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 1

Task: Adjust/align a transmitter output using appropriate test equipment and hand tools to meet manufacturer's and/or FCC specification.

Achievement Indicators: The learner:

	Yes	No
1. Deenergized system -	____	____
2. Gained access to the high frequency amplifier -	____	____
3. Located adjustment controls -	____	____
4. Identified amplifier specifications -	____	____
5. Connected input signal generator -	____	____
6. Connected output measuring device -	____	____
7. Energized system/equipment -	____	____
8. Made adjustments -	____	____
9. Deenergized equipment -	____	____
10. Disconnected test equipment -	____	____
11. Replaced access panels, covers, etc.	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
assorted screwdrivers-blade, phillips head; assorted wrenches; socket set with nut drivers; adjustment tools; insulated indicator; input generator; input signal; output measuring device.	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 2

Task: Align an RF oscillator using appropriate test equipment and tools to achieve a proper output signal.

Achievement Indicators: The learner:	Yes	No
1. Determined oscillator frequency, amplitude and wave shape characteristics from design specifications -	____	____
2. Deenergized system -	____	____
3. Gained access to oscillator -	____	____
4. Located adjustment controls -	____	____
5. Connected calibrated frequency measuring device to the oscillator output -	____	____
6. Placed frequency measuring device inductive pick-up next to oscillator amplifier -	____	____
7. Connected an oscilliscope to the oscillator output to check for proper wave form -	____	____
8. Energized system and equipment -	____	____
9. Made adjustments -	____	____
10. Deenergized system/equipment -	____	____
11. Disconnected test equipment -	____	____
12. Replaced access panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
assorted screwdrivers- blade, phillips head; adjustment tool; assorted frequency measuring device with inductive pick-up; high Z multimeter with leads; oscilloscope with compensated probe.	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 3

Task: Align frequency multiplier stage using proper test equipment and tools to obtain a proper output signal.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to frequency multiplier stage(s) -	____	____
3. Located tank circuit for stage -	____	____
4. Identified proper input and output frequencies -	____	____
5. Connected input frequency measuring device -	____	____
6. Connected output frequency device -	____	____
7. Energized system -	____	____
8. Made adjustments -	____	____
9. Deenergized system -	____	____
10. Disconnected test equipment -	____	____
11. Replaced access panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
assorted screwdrivers- blade, phillips; nut drivers; tuning tools; dual trace oscilloscope; frequency counter	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 4

Task: Align an RF driver stage using proper test equipment and tools to obtain a proper output signal.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to driver stage -	____	____
3. Located output adjustment tank circuit -	____	____
4. Identified operating parameters and specifications -	____	____
5. Connected test equipment to final power amplifier -	____	____
6. Energized system -	____	____
7. Made adjustments -	____	____
8. Deenergized system -	____	____
9. Disconnected test equipment -	____	____
10. Replaced panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
assorted screwdrivers- blade and phillips; assorted nut drivers; tuning tools; signal generator; volt meter; watt meter; dual trace oscilloscope	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 5

Task: Align an RF output amplifier using proper test equipment to obtain a proper output signal.

Achievement Indicators: The learner:	Yes	No
1. Gathered equipment and supplies -	____	____
2. Removed back from radio -	____	____
3. Removed radio chassis -	____	____
4. Located RF section -	____	____
5. Adjusted the oscillator at proper frequency according to specifications -	____	____
6. Fed the signal generator output to a radiation plate about 1 foot from the receiver loop -	____	____
7. Wobbled the signal generator and stopped at maximum responses -	____	____
8. Reduced the attenuator or increased the distance between the loops for a reading of .5 volt in the output meter -	____	____
9. Adjusted the trimmer on the mixer for peak output -	____	____
10. Reduced the attenuator and adjusted the trimmer on the antenna -	____	____
11. Checked reception sensitivity -	____	____
12. Turned off and replaced radio chassis -	____	____
13. Replaced back on radio -	____	____
14. Made final operational check -	____	____

NOTE: Keep the volume control at a maximum throughout the alignment procedure.

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 6

Task: Align an IF stage using proper test equipment and tools to obtain a proper output signal.

Achievement Indicators: The learner:	Yes	No
1. Gathered equipment and supplies -	____	____
2. Removed back from radio -	____	____
3. Removed chassis -	____	____
4. Located I.F. section -	____	____
5. Turned on radio -	____	____
6. Connected the output meter across the output of final IF stage or input of detector or discriminator -	____	____
7. Connected ground lead of signal generator to common negative -	____	____
8. Connected hot lead to converter signal grid through a .1 mdf isolation capacitor -	____	____
9. Adjusted signal generator to give a modulated signal at proper IF frequency -	____	____
10. Adjusted output and input I.F. transformer aligners for peak response -	____	____
11. Checked reception sensitivity -	____	____
12. Turned off and replaced radio chassis -	____	____
13. Replaced back on radio -	____	____
14. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 7

Task: Align an FM discriminator stage using proper test equipment and tools to obtain a proper signal output.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to discriminator section -	____	____
3. Located adjustment controls -	____	____
4. Connected input signal generator -	____	____
5. Energized system -	____	____
6. Applied unmodulated signal at proper frequency and strength -	____	____
7. Used measuring device and adjusted for peak output on discriminator input -	____	____
8. Used measuring device and adjusted for zero reading on discriminator output -	____	____
9. Deenergized system -	____	____
10. Removed test equipment -	____	____
11. Replaced covers, panels, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
Screwdrivers- blade and phillips assorted; nut drivers; tuning tools; volt meter; dual trace oscilloscope; FM signal generator	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 8

Task: Clean potentiometer controls using a proper solvent to obtain nondistorted, noise free operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to potentiometer -	____	____
3. Sprayed potentiometer -	____	____
4. Rotated control clockwise and counter clockwise -	____	____
5. Wiped excess cleaner -	____	____
6. Energized system -	____	____
7. Checked for noise free operation -	____	____
8. Deenergized system -	____	____
9. Replaced access panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
assorted screwdrivers- blade and phillips head; assorted wrenches; socket set; hex wrench; cleaning solution or degreaser; ohm meter	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 9

Task: Clean/lubricate all mechanical drive components using accepted procedures and chemicals to obtain normal operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to drive mechanism -	____	____
3. Wiped dirt, grease, lint from drive gears -	____	____
4. Removed excess cleaning solution from gears -- blowing dry if necessary -	____	____
5. Replaced access covers, panels, etc. -	____	____
6. Checked operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
assorted screwdrivers- blade and phillips head; assorted wrenches- hex and socket set; cleansing solution; cloth; flashlight; safety glasses; forced air: restricted flow	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 10

Task: Clean air filters with proper equipment to remove any contaminants which may affect proper operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Removed access panels -	____	____
3. Removed filter -	____	____
4. Performed cleaning activities -	____	____
5. Replaced filter -	____	____
6. Replaced access panels -	____	____
7. Energized system -	____	____
8. Tested for performance -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
flashlight; screwdriver, blade, assorted; cloth, wiping; vacuum cleaner; broom, whisk; cleaning solution; forced air (restricted pressure); cord, extension	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 11

Task: Clean chassis with proper equipment to remove any contaminants which may affect proper operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to chassis -	____	____
3. Removed loose dirt/lint -	____	____
4. Applied cleansing solution (allow time to soak) -	____	____
5. Wiped out excess dirt -	____	____
6. Removed all dirt and lint -	____	____
7. Blew dry, if necessary -	____	____
8. Replaced panels, covers -	____	____
9. Checked operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
wrenches, open end, assorted; screwdrivers, blade, assorted; screwdrivers, phillips head, assorted; cleaning solution; vacuum cleaner with attachment; forced air (restricted pressure); flashlight; cord, extension; broom, whisk; cleaning solution; cloth, wiping	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 12

Task: Clean circulation fans with proper equipment to remove any contaminants which may affect proper operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to fans -	____	____
3. Removed loose dirt, lint or grease from the fan -	____	____
4. Applied cleansing solution (allowed time to soak) -	____	____
5. Wiped off excess dirt, grease and lint -	____	____
6. Removed all visible dirt, grease and lint from fans and protective covers -	____	____
7. Blew dry, if necessary -	____	____
8. Replaced panels, covers, etc. -	____	____
9. Checked operation of fans -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
wrenches, socket, assorted; wrenches, allen, assorted; screwdrivers, blade, assorted; screwdrivers, phillips head, assorted; flashlight; vacuum cleaner with attachments; cord, extension; cloth, wiping; cleaning solution; forced air (restricted pressure); glasses, safety	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 13

Task: Adjust appropriate section of a modulator stage using proper test equipment and tools to ascertain that the output signal does not exceed 100% modulation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to transmitter circuit -	____	____
3. Located modulation controls -	____	____
4. Connected modulated RF generator to input of transmitter -	____	____
5. Connected output measuring device -	____	____
6. Energized system/equipment -	____	____
7. Made adjustments, as per manufacturer's specifications -	____	____
8. Deenergized system/equipment -	____	____
9. Disconnected test equipment -	____	____
10. Replaced access panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers, blade, assorted; screwdrivers, phillips head, assorted; wrenches, socket set, nut drivers; wrenches, hex; adjustment tools; generator, RF, modulated; output measuring device	

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 14

Task: Adjust circuit supply voltages using proper test equipment and tools to achieve proper operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Gained access to the circuit -	____	____
3. Located voltage adjustment controls -	____	____
4. Connected voltmeter to voltage test point -	____	____
5. Energized system/equipment -	____	____
6. Made voltage adjustments -	____	____
7. Deenergized system/equipment -	____	____
8. Disconnected test equipment -	____	____
9. Replaced access panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
adjustment tool; voltmeter; screwdrivers, blade, assorted; screwdrivers, phillips head, assorted; wrench, adjustable	

Duty: Maintaining Communicatons Devices	**Duty No.** A
	Task No. 15

Task: Align a Monostable IC Circuit for proper delay time using appropriate test equipment and hand tools to assure proper operation of the circuit.

Achievement Indicators: The learner:

	Yes	No
1. Deenergized system -	____	____
2. Gained access to digital timing circuit -	____	____
3. Located adjustment controls -	____	____
4. Connected oscilloscope to output point -	____	____
5. Energized system/equipment -	____	____
6. Made adjustments -	____	____
7. Deenergized system/equipment -	____	____
8. Disconnected equipment -	____	____
9. Replaced access panels, covers, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:
screwdrivers, blade, assorted; screwdrivers, phillips head, assorted; wrench, adjustable; oscilloscope, calibrated (horizontal and vertical)

Resources:

Duty: Maintaining Communications Devices	**Duty No.** A
	Task No. 16

Task: Adjust/align, HF, VHF, UHF antenna using appropriate test equipment, procedures, and hand tool to assure that the standing wave ratio (SWR) meets manufacturer's specifications.

Achievement Indicators: The learner:	Yes	No
1. Deenergized system -	____	____
2. Located adjustment controls and/or methods -	____	____
3. Placed SWR meter in transmission line between transmitter and antenna -	____	____
4. Energized system -	____	____
5. Keyed transmitter and noted SWR readings in short period of time -	____	____
6. Made adjustments -	____	____
7. Keyed transmitter and made sure SWR was less than 2:1 ratio -	____	____
8. Repeated adjustments until SWR was less than 2:1 ratio -	____	____
9. Deenergized system -	____	____
10. Removed SWR meter from line and reconnected transmission line -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers- blade and phillips assorted; key set; diagonal cutters; open end wrenches assorted; SWR meter	

Duty: Designing Equipment and Circuitry	**Duty No.** B
	Task No. 1

Task: Construct a transistor electronic circuit from a schematic, using proper tools, components, and test equipment, to obtain an operational circuit.

Achievement Indicators: The learner:

	Yes	No
1. Obtained proper components specified in schematic -	____	____
2. Constructed circuit in accordance with schematic -	____	____
3. Connected test equipment -	____	____
4. Energized system -	____	____
5. Checked for proper operation -	____	____
6. Trouble shooted malfunctions and corrected same to obtain proper operation -	____	____
7. Deenergized system -	____	____
8. Removed test equipment -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
diagonal cutters; experimentors board; hook-up wire; volt meter; OHM meter; dual trace oscilloscope; power supply; signal generator	

Duty: Designing Equipment and Circuitry	**Duty No.** B
	Task No. 2

Task: Design a digital logic truth table using operational parameters to meet specifications required.

Achievement Indicators: The learner:

	Yes	No
1. Obtained specifications -	____	____
2. Determined operational parameter -	____	____
3. Constructed truth table(s) to meet operational characteristics desired by specifications -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
None	

Duty: Designing Equipment and Circuitry	**Duty No.** B
	Task No. 3

Task: Design and construct a digital logic circuit using a truth table to obtain the circuit operation desired.

Achievement Indicators: The learner:	Yes	No
1. Obtained truth table -	____	____
2. Designed digital logic circuit -	____	____
3. Obtained proper IC chips -	____	____
4. Constructed circuit in accordance with design -	____	____
5. Energized circuit -	____	____
6. Made appropriate measurements to assure proper operation -	____	____
7. Deenergized system -	____	____

Criteria: Competence in the task will be recognzied when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
logic probe; logic pulser; logic clip; volt meter; power supply; wire strippers; experimenter board	TTL Cookbook

Duty: Designing Equipment and Circuitry	**Duty No.** B
	Task No. 4

Task: Design and construct an I.C. operational amplifier circuit using operational parameters given by the manufacturer to obtain the circuit operation desired.

Achievement Indicators: The learner:	Yes	No
1. Obtained operational parameters -	____	____
2. Designed circuit -	____	____
3. Constructed circuit in accordance with design -	____	____
4. Connected appropriate test equipment -	____	____
5. Energized system -	____	____
6. Made measurements -	____	____
7. Deenergized system -	____	____
8. Corrected circuit so as to obtain proper operation -	____	____
9. Energized system -	____	____
10. Made measurements (NOTE: Items 7,8,9,10 shall be repeated until proper achievement is obtained) -	____	____
11. Deenergized system -	____	____
12. Removed test equipment -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
experimenter board; hood-up wire; OP amps; dual trace oscilloscope; signal generator; voltmeter	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 1

Task: Test and replace if necessary voltage input components to a transmitter or receiver using approoriate test equipment and hand tools to assure proper operation.

Achievement Indicators: The learner:

	Yes	No
1. Deenergized system -	____	____
2. Located fuse -	____	____
3. Checked continuity of fuse -	____	____
4. Checked continuity of line	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
diagonal cutters; screwdrivers; OHM meter; vinly tape; continuity checker	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 2

Task: Test and replace if neccessary an integrated circuit (IC) chip used in an RF oscillator using appropriate test equipment and hand tools to assure proper operation of the oscillator circuit.

Achievement Indicators: The learner:	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to oscillator -	____	____
3. Positioned oscillator for easy access to chip -	____	____
4. Tested IC chip using appropriate test equipment -	____	____
5. If faulty, installed new IC chip-	____	____
NOTE: If soldering is required use 15 to 20 watt soldering iron, take proper precautions for heat and static electricity. Use solder sucker or solder wick in removing faulty IC chip.		
6. Checked oscillator for:		
a. Stability (drift etc.) -	____	____
b. Proper frequency -	____	____
7. Replaced cabinet, back etc. -	____	____
8. Made final operational check -	____	____

Criteria: Competence in task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers; logic probe; oscilloscope; soldering iron; solder; new IC diagonal; cutters; long nose pliers	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 3

Task: Test and replace if neccessary an integrated circuit chip used in a frequency multiplier using appropriate test equipment and hand tools to assure the proper operation of the circuit.

Achievement Indicators: The learner:

	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to multiplier -	____	____
3. Positioned for easy access -	____	____
4. Tested IC chip -	____	____
5. Installed new IC chip (if faulty) -	____	____

NOTE: If soldering is required, use 15 to 20 watt soldering iron, take proper precautions to avoid over heating and damage from static electricity. Use solder sucker or solder wick.

6. Checked frequency multiplier for proper operation:		
a. Checked proper output frequency -	____	____
b. Checked stability -	____	____
7. Replaced cabinet back, etc. -	____	____
8. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers; diagonal cutters soldering iron; new IC; logic probe; oscilloscope	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 4

Task: Test and replace if necessary an Integrated Circuit Chip used in a modulator using appropriate test equipment and hand tools to assure proper operation of the circuit.

Achievement Indicators: The learner:	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to modulator and chip -	____	____
3. Positioned for easy access -	____	____
4. Tested IC chip -	____	____
5. Installed new chip (if faulty)-	____	____
NOTE: If soldering is required use 15 to 20 watt soldering iron, take proper precautions to avoid over heating and damage from static electricity. Use solder sucker or solder wick.		
6. Replaced cabinet back, etc. -	____	____
7. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
soldering iron; solder sucker or solder wick; long nose pliers; diagonal pliers; logic probe; oscilloscope	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 5

Task: Test and replace if necessary an Integrated Circuit Chip used in a Phase-Lock Loop Circuit using appropriate test equipment and hand tools to assure proper operation of the circuit.

Achievement Indicators:

The learner:	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to circuit -	____	____
3. Positioned for easy access -	____	____
4. Tested Intergrated Circuit -	____	____
5. Installed new chip (if faulty) -	____	____
NOTE: If soldering is necessary use 15 to 20 watt soldering iron. Take proper precautions to avoid over heating and damage from static electricity.		
6. Checked to assure proper operation -	____	____
7. Replaced cabinet; Back, etc. -	____	____
8. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment: screwdrivers; diagonal cutters; soldering iron; long nose pliers; logic probe; oscilloscope

Resources:

Duty: Service Communications Devices	**Duty No.** C
	Task No. 6

Task: Test and replace if necessary an Integrated Circuit Digital chip of the 7400 series family using appropriate test equipment and hand tools to assure proper operation of the circuit.

Achievement Indicators: The learner:

	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to circuit -	____	____
3. Positioned for easy access -	____	____
4. Tested Intergrated Circuit -	____	____
5. Installed new chip (if faulty) -	____	____

NOTE: If soldering is necessary, use 15 to 20 watt soldering iron. Take proper precautions to avoid overheating and damage from static electricity .

6. Checked to assure proper operation -	____	____
7. Replaced cabinet, back etc. -	____	____
8. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
soldering iron; chip pullers; logic probe; screwdrivers; diagonal cutters; oscilloscope	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 7

Task: Test and replace if necessary, a C-MOS Integrated Circuit Chip utilized in a digital circuit using appropriate test equipment procedures, and hand tools to assure proper operation of the circuit.

Achievement Indicators: The learner:

	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to circuit -	____	____
3. Positioned for easy access -	____	____
4. Tested Intergrated circuit -	____	____
5. Replaced with new chip (if faulty) -	____	____

NOTE: If using soldering iron, use 15 to 20 watt iron, take proper precautions to avoid overheating and damage from static electricity. Use solder sucker and solder wick.

6. Checked to assure proper operation -	____	____
7. Replaced cabinet, back etc. -	____	____
8. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:
soldering iron; solder sucker; solder wick; long nose pliers; diagonal cutters; logic probe; oscilloscope

Resources:

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 8

Task: Test and replace if necessary a digital display segment using appropriate test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:	Yes	No
1. Gained access to circuitry -	____	____
2. Energized system -	____	____
3. Tested output of segment driver -	____	____
4. Tested display segments individually -	____	____
5. Deenergized system -	____	____
6. Replaced display segment using proper methods -	____	____
7. Energized system -	____	____
8. Tested system to assure proper operation -	____	____
9. Deenergized system -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
power supply; logic probe; logic pulser; logic clip	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 9

Task: Test and replace if necessary a CRT deflection yoke using appropriate test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:	Yes	No
1. Deenergize circuit -	____	____
2. Removed from cabinet -	____	____
3. Positioned for easy access -	____	____
4. Used yoke and flybock tester to determine if yoke was faulty -	____	____
5. Replaced with new yoke (if faulty) -	____	____
6. Adjusted horizontal oscillator and amplifier controls for proper output signal -	____	____
7. Replaced cabinet or back as necessary -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
soldering iron; screwdrivers; nut drivers; yoke; fly block checker; solder	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 10

Task: Test and replace if necessary a microphone using appropriate test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:	Yes	No
1. Connected microscope to test equipment -	____	____
2. Spoke into microphone and observed wave form -	____	____
3. Disassembled microphone and checked for bad connections -	____	____
4. Corrected any faulty wiring or connections -	____	____
5. Reassembled and retested microphone -	____	____
6. Disassembled and replaced transducer if found still defective -	____	____
7. Reassembled and retested for proper operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers- blade and phillips assorted; soldering pencil; dual trace oscilloscope	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 11

Task: Test and replace if necessary a monostable integrated circuit chip using appropriate test equipment and hand tools to assure proper operation.

Achievement Indicators: The learner:	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to chip -	____	____
3. Tested intergrated circuit -	____	____
4. Replaced with new chip (if faulty) -	____	____
NOTE: Used proper desoldering techniques for removing IC's.		
5. Replaced cabinet -	____	____
6. Made final operational test -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers; diagonal cutters; logic probe; oscilloscope; long nose pliers; solder sucker; solder wick	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 12

Task: Test and replace if necessary a photo-electric relay using appropriate test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:	Yes	No
1. Energized system -	____	____
2. Applied photo signal to activate relay -	____	____
3. Made measurements while activating photo signal -	____	____
4. Deenergized system -	____	____
5. Replaced relay if determined faulty -	____	____
6. Energized system -	____	____
7. Retested to assure proper operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
none	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 13

Task: Test and replace if necessary Selsyn Unit of a Servomechanism using appropriate test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:	Yes	No
1. Deenergized selsyn -		
2. Checked motor starting capacitor -		
3. Replaced (if faulty) -		
4. Replaced cabinet or housing -		
5. Checked for proper operation -		

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
soldering iron; diagonal cutters; capacitor checker; screwdrivers	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 14

Task: Test and replace if necessary a magnetic tape head using appropriate test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:	Yes	No
1. Deenergized circuit -	____	____
2. Gained access to tape head -	____	____
3. Used appropriate test equipment to test -	____	____
4. Replaced tape head (if faulty) -	____	____
5. Tested for proper operation -	____	____
6. Cabinet replaced -	____	____
7. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
screwdrivers; soldering iron; long nose pliers; solder sucker; solder wick	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 15

Task: Test and replace if necessary a Transducer using appropraite test equipment and hand tools to assure proper operation of the unit.

Achievement Indicators: The learner:

	Yes	No
1. Gained access to component and circuitry -	____	____
2. Energized system -	____	____
3. Applied appropriate signal and measured output from transducer -	____	____
4. Deenergized system -	____	____
5. Replaced transducer -	____	____
6. Energized system -	____	____
7. Rechecked for proper operation -	____	____
8. Deenergized system -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:
volt meter; dual trace oscilloscope; signal generator; screwdrivers- blade & phillips assorted; nut drivers

Resources:

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 16

Task: Test and replace if necessary UHF coaxial connectors of various types using approoriate test equipment, proceudres, and hand tools to assure proper operation of its functional purpose.

Achievement Indicators: The learner:	Yes	No
1. Measured continuity of cable and connector -	____	____
2. Measured for short in connector -	____	____
3. Repaired connector connections to assure proper operation -	____	____
4. Replaced irrepairable connector -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
OHM meter; soldering gun or pencil	

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 17

Task: Repair audio output transformer, using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Located audio output transformer -	____	____
4. Checked audio output transformer voltage -	____	____
5. Checked audio output transformer resistance -	____	____
6. If audio output transformer checked faulty, replaced by:		
a. disconnecting wires from transformer -	____	____
b. removing transformer from mounts -	____	____
c. selecting proper replacement transformer -	____	____
d. remounting transformer -	____	____
e. connecting wires -	____	____
7. Turned-on radio and checked reception -	____	____
8. Replaced radio chassis -	____	____
9. Replaced back on radio -	____	____
10. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 18

Task: Repair change switch using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Located contacts as identified on schematic -	____	____
4. Tested contacts for continuity -	____	____
5. Tested contacts for voltage -	____	____
6. Repaired switch if possible -	____	____
7. Replaced switch if not repairable:		
a. selected proper replacement switch -	____	____
b. removed faulty switch from mount -	____	____
c. attached new switch to mount -	____	____
8. Tested radio for switch operation -	____	____
9. Replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 19

Task: Repair speaker using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis if necessary -	____	____
3. Positioned radio for easy access to speaker -	____	____
4. Visually checked the speaker cone -	____	____
5. Gently pushed speaker cone in and out and checked for sticking or dragging -	____	____
6. Checked resistance of voice coil -	____	____
7. Replaced speaker if defective:		
a. disconnected speaker wires -	____	____
b. removed speaker from mount -	____	____
c. selected proper replacement speaker -	____	____
d. installed replacement speaker -	____	____
e. connected speaker wires -	____	____
8. Checked speaker operation -	____	____
9. If removed, replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 20

Task: Replace auto radios, using necessary tools to provide car radio operation.

Achievement Indicators: The learner:

	Yes	No
1. To remove radio:		
a. visually checked radio mounting -	____	____
b. made plan for dismounting -	____	____
c. disconnected automobile battery -	____	____
d. disconnected controls, switches and air conditioning vents (where applicable) -	____	____
e. disconnected antenna and speaker connections -	____	____
f. dismounted radio -	____	____
2. To install radio:		
a. mounted radio -	____	____
b. connected antenna and speaker to radio -	____	____
c. put controls, switches and air conditioning vents in place -	____	____
3. Turned-on radio and checked for proper operation -	____	____

Note: Make sure all screws, nuts and connections are tight to prevent noise.

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 21

Task: Check/replace volume control using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to the volume control -	____	____
4. Checked the volume control by moving control through full range and listening -	____	____
5. If noisy, cleaned and rechecked -	____	____
6. If cleaning did not clear noise, replaced volume control as follows:		
a. made pictoral diagram of all connections and disconnected volume control -	____	____
b. removed control from mount -	____	____
c. selected proper replacement control -	____	____
d. installed replacement control on mount according to diagram -	____	____
e. reconnected wires to proper terminal -	____	____
7. Turned radio on and checked operation of radio -	____	____
8. Turned radio off -	____	____
9. Replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 22

Task: Check/replace tuning capacitor using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to tuning capacitor -	____	____
4. Checked tuning capacitor for proper insulation -	____	____
5. Checked tuning capacitor for shorts or loose connection -	____	____
6. If capacitor checked faulty, repaired, if possible -	____	____
7. Replaced tuning capacitor if repair was not possible :		
a. made pictoral diagram of all connections -	____	____
b. removed tuning capacitor -	____	____
c. selected proper replacement capacitor -	____	____
d. installed replacement tuning capacitor according to diagram -	____	____
e. turned radio on -	____	____
f. aligned and checked for proper operation -	____	____
8. Turned radio off -	____	____
9. Replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competnece in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 23

Task: Check/replace electron tubes using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Turned radio on and checked tubes for lit filaments -	____	____
3. Isolated faulty stage -	____	____
4. Unplugged tube and checked on tube checker or substitute with known good tube -	____	____
5. Replaced faulty tube(s)		
a. selected proper replacement tube -	____	____
b. plugged tube in socket -	____	____
c. turned radio on and checked operation of radio -	____	____
6. Turned radio off and replaced back on radio -	____	____
7. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 24

Task: Check/repair/replace electron tube sockets using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to tube sockets -	____	____
4. Visually checked tube socket for broken pins, loose connection or broken base -	____	____
5. Repaired loose connection, if any were found -	____	____
6. Replaced broken socket pin or socket base:		
a. removed tube -	____	____
b. made pictoral diagram of all connections and removed socket -	____	____
c. selected proper replacement tube socket -	____	____
d. installed replacement tube socket according to diagram -	____	____
e. replaced tube -	____	____
7. Turned radio on and checked operation -	____	____
8. Turned radio off -	____	____
9. Replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 25

Task: Check/replace transistor sockets using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to the radio circuits -	____	____
4. Tested the connection of transistor socket -	____	____
5. Checked transistor for broken terminals and/or broken case -	____	____
6. Replaced transistor socket, if faulty:		
a. removed transistor from socket -	____	____
b. disconnected socket terminal -	____	____
c. removed socket from chassis -	____	____
d. selected proper replacement -	____	____
e. installed replacement socket -	____	____
f. replaced transistor -	____	____
7. Turned radio on and checked operation -	____	____
8. Turned off and replaced radio chassis -	____	____
9. Replaced back on radio -	____	____
10. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 26

Task: Check/replace transistors using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to transistors -	____	____
4. Made necessary checks to isolate faulty transistors -	____	____
5. Removed faulty transistor -	____	____
6. Selected proper replacement transistor -	____	____
7. Installed replacement transistor -	____	____
Note: If soldering is required, use heat sink to prevent heat damage to the replacement transistor.		
8. Turned radio on and check for proper operation -	____	____
9. Checked DC bias on replacement transistor(s) -	____	____
10. Turned radio off -	____	____
11. Replaced radio chassis -	____	____
12. Replaced back on radio -	____	____
13. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 27

Task: Check/replace tone control using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to the tone control -	____	____
4. Turned on radio -	____	____
5. Checked tone variations by turning tone control knob -	____	____
6. Checked voltage at tone control terminals -	____	____
7. Turned off radio -	____	____
8. Checked resistance of tone control -	____	____
9. If defectice, replaced tone control by:		
a. disconnecting tone control -	____	____
b. removing tone control from mount -	____	____
c. selecting proper replacement tone control -	____	____
d. installing replacement tone control -	____	____
10. Turned on radio -	____	____
11. Checked radio for proper operation -	____	____
12. Turned off radio -	____	____
13. Replaced radio chassis -	____	____
14. Replaced back on radio -	____	____
15. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 28

Task: Check/repair/replace earphone/earplug using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Turned on radio -	____	____
2. Checked radio speaker(s) for sound -	____	____
3. Plugged earphone plug into earphone jack -	____	____
4. Inserted earphone in ear -	____	____
5. If no sound was received through earphone, checked earphone and earplug for:		
a. broken or frayed wires -	____	____
b. broken case on earphone or plug -	____	____
c. continuity -	____	____
d. loose connections -	____	____
6. If plug was defective:		
a. repaired, if possible -	____	____
b. replaced by:		
(1) disconnecting defective plug -	____	____
(2) selecting proper replacement plug -	____	____
(3) connecting replacement plug -	____	____
7. If earphone was defective, replaced by:		
a. unplugging defective earphone -	____	____
b. selecting proper replacement earphone -	____	____
c. plugging in replacement earphone -	____	____
8. Tested earphone for proper operation -	____	____
9. Turned off radio -	____	____

Criteria: Competence in the task will be reocgnized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 29

Task: Adjust record player stylus pressures using necessary test equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Tested stylus pressure -	____	____
2. Adjusted the balance weights or balance springs as directed in service manual -	____	____
Note: Improper pressures may result in damage to both stylus and records.		
3. Placed record on record changer -	____	____
4. Turned record changer on -	____	____
5. Checked operation of changer and stylus -	____	____
6. Turned record changer off -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 30

Task: Clean/lubricate record changer using necessary equipment and hand tools, to restore the unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Positioned record changer for easy access to drive mechanism -	____	____
2. Brushed all dust and dirt from drive mechanism -	____	____
3. Cleaned idler wheels -	____	____
4. Cleaned turntable -	____	____
5. Lubricated the drive mechanism -	____	____
Note: Do not grease rubber portion of idler wheel and turntable.		
6. Check record changer for proper operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 31

Task: Operate equipment using necessary test equipment and hand tools, to achieve proper utilization of equipment.

Achievement Indicators: The learner:

	Yes	No
1. Planned demonstration		
a. gathered information -	____	____
b. reviewed operation -	____	____
c. tested equipment for proper operation -	____	____
d. planned sequence of presentation -	____	____
e. selected demonstration site -	____	____
f. arranged adequate space for audience observation -	____	____
2. Presented demonstration		
a. introduced self and topic -	____	____
b. demonstrated equipment operation in logical or sequential order -	____	____
c. summarized -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 32

Task: Check/replace capacitors, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to circuits -	____	____
4. Made circuit checks until defective capacitor was located in the defective stage -	____	____
5. Removed defective capacitor -	____	____
6. Selected proper replacement capacitor -	____	____
7. Installed replacement capacitor -	____	____
8. Turned on radio and checked reception -	____	____
9. Replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 33

Task: Check/replace on-off switch, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Tested continuity of switch -	____	____
4. Replaced swith if defective:		
a. desoldered switch wires -	____	____
b. removed defective switch -	____	____
5. Installed replacement switch:		
a. connected wires -	____	____
b. soldered wires on replacement switch -	____	____
6. Turned on radio -	____	____
7. Checked radio for proper operation -	____	____
8. Turned set off -	____	____
9. Replaced radio chassis -	____	____
10. Replaced back on radio -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 34

Task: Check/replace IF transformer, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to IF circuit -	____	____
4. Located IF circuit on schematic -	____	____
5. Checked voltage and resistance to identify defective IF transformer -	____	____
6. Removed defective transformer -	____	____
7. Selected proper replacement transformer -	____	____
8. Installed replacement transformer and aligned to factory specifications -	____	____
9. Turned on radio -	____	____
10. Checked radio reception -	____	____
11. Turned off and replaced radio chassis -	____	____
12. Replaced back on radio -	____	____
13. Checked receiver operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 35

Task: Check/replace dial light, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Positioned radio for easy access to dial light -	____	____
3. Removed dial light from radio -	____	____
4. Checked bulb, if blown, replaced as follows:		
a. selected proper replacement -	____	____
b. installed new bulb -	____	____
5. Turned on radio -	____	____
6. Checked bulb for operation -	____	____
7. Replaced back on radio -	____	____
8. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 36

Task: Check and replace dial cord, using necessary test equipment and hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to dial cord -	____	____
4. Visually inspected dial cord for:	____	____
a. broken cord		
b. stretched cord		
c. dirty cord		
5. Replaced faulty cord:		
a. removed old cord -	____	____
b. selected proper size and length of cord -	____	____
c. strung dial according to schematic specifications -	____	____
6. Replaced radio chassis -	____	____
7. Replaced back on radio -	____	____
8. Checked dial for proper operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 37

Task: Check/repair/replace case or cabinet, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Inspected damage -	____	____
2. Repaired if possible -	____	____
3. If cabinet or case was to be replaced, followed these procedures:		
a. removed back from radio -	____	____
b. removed control knobs -	____	____
c. removed radio from case or cabinet -	____	____
d. selected replacement cabinet or case -	____	____
e. installed radio in new cabinet or case -	____	____
f. put control knobs on radio -	____	____
g. replaced back on radio -	____	____
4. Turned on radio -	____	____
5. Checked radio reception -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 38

Task: Check/replace battery holders, using test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed battery from radio -	____	____
2. Visually examined the battery holder for corrosion and loose or broken connection -	____	____
3. Repaired holder, if possible -	____	____
4. Replaced, if necessary:		
a. selected proper replacement battery holder -	____	____
b. installed replacement battery holder -	____	____
c. replaced battery -	____	____
5. Turned on radio -	____	____
6. Checked radio for proper operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 39

Task: Check/replace batteries, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed battery cover from radio -	____	____
2. Checked batteries for proper voltage output with radio turned on -	____	____
3. Removed batteries from radio -	____	____
4. Replaced faulty batteries if load voltage was low:		
a. selected proper replacement batteries -	____	____
b. installed new batteries in proper polarity -	____	____
c. replaced battery cover -	____	____
5. Turned radio on and checked for proper operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Servicing Communications Devices	**Duty No.** C
	Task No. 40

Task: Check/replace resistors, using necessary test equipment and hand tools, to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from radio -	____	____
2. Removed radio chassis -	____	____
3. Positioned radio for easy access to circuit -	____	____
4. Observed circuit for discolored or burned resistors -	____	____
5. Turned radio on -	____	____
6. Observed for heated or heating resistors -	____	____
7. Checked voltages and resistance to isolate faulty resistor -	____	____
8. Removed faulty resistor -	____	____
9. Selected proper value replacement resistor -	____	____
10. Installed replacement resistor -	____	____
11. Checked radio for proper operation -	____	____
12. Turned off radio and replaced radio chassis -	____	____
13. Replaced back on radio -	____	____
14. Made final operational check -	____	____

Criteria: Competence in the task will ge recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 1

Task: Analyze waveforms of keying pulse to blanker using oscilloscipe and necessary hand tools to gain proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from set*-	____	____
2. Positioned set for easy access to blanker circuit -	____	____
3. Turned set on -	____	____
4. Connected rpobe to input of blanker tube or transistor -	____	____
5. Observed waveform on oscilloscope -	____	____
6. Checked amplitude and width -	____	____
7. Compared waveform to schematic -	____	____
8. Discussed waveform with instructor -	____	____
9. Disconnected scope -	____	____
10. Turned set off -	____	____
11. Replaced back on set -	____	____
12. Made final operational check -	____	____

* Catution: One side of the AC line may be connected to the chasis, use isolation transformer for servicing. Beware of electrical shock hazard from high voltage and AC. Discharge high voltage.

Criteria: Competence in the task will be recognzied when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**
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Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 2

Task: Analyze waveforms of gating pulse to burst amplifier using oscilloscope and necessary hand tools to gain proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned TV set for easy access to chroma burst amplifier -	____	____
3. Turned on TV set -	____	____
4. Located chroma burst amplifier -	____	____
5. Connected oscilloscope to inpur to burst amplifier -	____	____
6. Observed waveform -	____	____
7. Compared waveform to schematic -	____	____
8. Discussed analysis with instructor -	____	____
9. Disconnected oscilloscope -	____	____
10. Turned off TV set -	____	____
11. Replaced back on TV set -	____	____
12. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 3

Task: Analyze output waveform of red demodulator using an oscilloscope and proper hand tools, to gain proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned the set for easy access to the demodulator circuit -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color bar generator to VHF antenna terminals -	____	____
5. Turned on set -	____	____
6. Located red demodulator -	____	____
7. Connected oscilloscope probe to output of red modulator -	____	____
8. Observed waveform -	____	____
9. Compared waveform with schematic -	____	____
10. Discussed analysis with instructor -	____	____
11. Disconnected oscilloscope -	____	____
12. Turned off TV set -	____	____
13. Reconnected VHF antenna -	____	____
14. Replaced back on TV set -	____	____
15. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 4

Task: Analyze output waveform of 3.58 MHZ oscillator using oscilloscope and proper hand tools, to gain proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned set for easy access the 3.58 MHZ oscillator -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color bar generator to antenna terminal -	____	____
5. Turned on set -	____	____
6. Located 3.58 MHZ oscillator -	____	____
7. Connected oscilloscope probe to output of the 3.58 MHZ oscillator circuit -	____	____
8. Observed waveform -	____	____
9. Compared waveform to schematic -	____	____
10. Discussed analysis with instructor -	____	____
11. Disconnected oscilloscope -	____	____
12. Turned off TV set -	____	____
13. Connected VHF antenna -	____	____
14. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 5

Task: Analyze output waveform of green demodulator using oscilloscope and proper hand tools, to gain a proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned set for easy access to the demodulator -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color bar to antenna terminal -	____	____
5. Turned on set -	____	____
6. Located green demodulator -	____	____
7. Connected oscilloscope probe to output of green demodulator -	____	____
8. Observed waveform -	____	____
9. Compared waveform to schematic -	____	____
10. Discussed analysis with instructor -	____	____
11. Disconnected oscilloscope -	____	____
12. Turned off TV set -	____	____
13. Connected VHF antenna -	____	____
14. Replaced back on TV set -	____	____
15. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 6

Task: Analyze output waveform of blue demodulator using oscilloscope and proper hand tools to gain a proficiency in waveform analysis.

Achievement Indicators: The learner:

		Yes	No
1.	Removed back from TV set -	____	____
2.	Positioned set for easy access to the demodulator -	____	____
3.	Disconnected VHF antenna -	____	____
4.	Connected color bar generator to antenna terminal -	____	____
5.	Turned on set -	____	____
6.	Located blue demodulator -	____	____
7.	Connected oscilloscope probe to output of demodulator-	____	____
8.	Observed waveform -	____	____
9.	Compared waveform to schematic -	____	____
10.	Discussed analysis with instructor -	____	____
11.	Disconnected oscilloscope -	____	____
12.	Turned off TV set -	____	____
13.	Connected VHF antenna -	____	____
14.	Replaced back on TV set -	____	____
15.	Made final operational check -	____	____

Criteria: Competence in the task will be recognzied when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 7

Task: Analyze waveform output of bandpass amplifier, using oscilloscope and proper hand tools to gain a proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set-	____	____
2. Positioned set for easy access to bandpass amplifier -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color bar generator to antenna terminal -	____	____
5. Turned on TV set -	____	____
6. Located bandpass amplifier circuit -	____	____
7. Connected oscilloscope probe to out of bandpass amplifier -	____	____
8. Observed waveform on oscilloscope -	____	____
9. Compared waveform with schematic -	____	____
10. Discussed analysis with instructor -	____	____
11. Turned off TV set -	____	____
12. Replaced back on TV set -	____	____
13. Connected VHF antenna -	____	____
14. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 8

Task: Analyze input waveform to phase detector using oscilloscope and necessary hand tools to gain a proficiency in waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned set for easy access to phase detector -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color bar genrator to antenna terminal -	____	____
5. Turned on TV set -	____	____
6. Located phase detector stage -	____	____
7. Connected oscilloscope probe to input phase of detector -	____	____
8. Observed waveform on oscilloscope -	____	____
9. Compared waveform with schematic -	____	____
10. Discussed analysis with instructor -	____	____
11. Disconnected oscilloscope -	____	____
12. Turned off TV set -	____	____
13. Replaced back on TV set -	____	____
14. Connected VHF antenna -	____	____
15. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 9

Task: Analyze input waveform to color demodulators using oscilloscope and necessary hand tools to gain a proficiency in input waveform analysis.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned set for easy access to demodulator circuit -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color bar generator to antenna terminal -	____	____
5. Turned set on -	____	____
6. Connected scope probe to input of demodulators circuit -	____	____
7. Observed input waveform on scope and compared with schematic reference -	____	____
8. Discussed his/her analysis with instructor -	____	____
9. Disconnected scope -	____	____
10. Turned set off -	____	____
11. Replaced back -	____	____
12. Connected VHF antenna -	____	____
13, Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 10

Task: Analyze color problems by viewing a color television program using any required material to gain proficiency in visual troubleshooting.

Achievement Indicators: The learner:	Yes	No
1. Turned set on -	____	____
2. Selected a channel broadcasting color program -	____	____
3. Observed picture for:		
a. color content -	____	____
b. color sync -	____	____
c. tint -	____	____
d. color detail -	____	____
e. proper focus -	____	____
f. fine tuning -	____	____
4. Diagnosed problem -	____	____
5. Discussed analysis with instructor -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 11

Task: Analyze a color problem using the color dot-bar generator and the proper hand tools to restore unit to proper operation.

Achievement Indicators: The learner:

	Yes	No
1. Turned on TV set -	____	____
2. Disconnected VHF antenna -	____	____
3. Connected color dot-bar generator to VHF antenna terminals -	____	____
4. Turned channel selector to correspond to channel on color dot-bar generator -	____	____
5. Turned on color dot-bar generator -	____	____
6. Turned color dot-bar generator -	____	____
7. Observed screen color for SYNC, order or color, shade and intensity of color -	____	____
8. Rotated tint control and observed shifting of red bar-	____	____
9. Diagnosed problem -	____	____
10. Discussed analysis with instructor -	____	____
11. Turned off color dot-bar generator and disconnected from VHF antenna terminals -	____	____
12. Connected VHF antenna -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 12

Task: Analyze burst output waveform using proper test equipment and hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back of TV set -	____	____
2. Positioned set for easy access to burst amplifies* -	____	____
3. Disconnected VHF antenna -	____	____
4. Connected color generator to antenna terminal -	____	____
5. Turned set on -	____	____
6. Connected scope probe to burst amplifier output -	____	____
7. Observed burst waveform on scope and compared with schematic reference -	____	____
8. Discussed analysis with instructor -	____	____
9. Disconnected scope -	____	____
10. Turned set off -	____	____
11. Replaced TV back -	____	____
12. Connected VHF antenna -	____	____
13. Checked receiver operation -	____	____

*CAUTION: One side of the AC line may be connected to the chasis, use isolation transformer for servicing. Beware of electrical shock hazard from high voltage and AC. Discharge high voltage.

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 13

Task: Remove the television chassis from cabinet using necessary equipment and hand tools to ready unit for proper service testing.

Achievement Indicators: The learner:

	Yes	No
1. Disconnected line cord -	____	____
2. Removed the back from TV set -	____	____
3. Positioned set for easy access to chassis -	____	____
4. Discharged CRT as 2nd anode -	____	____
5. Disconnected the following:		
a. CRT socket -	____	____
b. high voltage anode -	____	____
c. yoke -	____	____
d. convergence board -	____	____
e. speaker -	____	____
f. degaussing coil -	____	____
g. tuner if possible -	____	____
h. VHF/UHF antennas -	____	____
6. Removed mounting screws -	____	____
7. Removed chassis from cabinet -	____	____
8. Replaced chassis:		
a. positioned cabinet for easy access to back of cabinet -	____	____
b. placed chassis in proper position in cabinet -	____	____
c. connected the following:		
(1) CRT socket -	____	____
(2) high voltage anode -	____	____
(3) yoke -	____	____
(4) convergence board -	____	____
(5) speaker -	____	____
(6) degaussing coil -	____	____

The learner:	Yes	No
(7) tuner if disconnected -	____	____
(8) VHF/UHF antennas -	____	____
d. replaced mounting screws -	____	____
e. replaced back on TV -	____	____
8. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 14

Task: Pick-up/deliver a television set using required invoices to achieve a business-like transaction.

Achievement Indicators: The learner:	Yes	No
A. PICK-UP		
1. Secured customer's name, address and phone number -	____	____
2. Drove delivery vehicle to customer's location -	____	____
3. Greeted customer and identified themselves -	____	____
4. Turned set on and checked for problem -	____	____
5. Unplugged TV and disconnected antenna -	____	____
6. Covered TV with blanket -	____	____
7. Placed TV in delivery vehicle -	____	____
8. Tied set down securely in delivery vehicle -	____	____
9. Drove back to shop -	____	____
10. Moved TV into shop-	____	____
B. DELIVER		
1. Covered TV with blanket -	____	____
2. Placed TV in delivery vehicle -	____	____
3. Tied set down securely in delivery vehicle -	____	____
4. Drove to customer's location -	____	____
5. Greeted customer and identified themselves -	____	____
6. Moved TV into customer's house and placed in normal operating position -	____	____
7. Plugged set in and connected antenna -	____	____
8. Turned set on -	____	____
9. Made necessary adjustments -	____	____

The learner:	Yes	No
10. Presented service ticket to customer and collected for services -	____	____
11. Returned to shop -	____	____
12. Balanced debit and credits against receipts -	____	____
13. Placed office copy of bill in file -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 15

Task: Call a customer, using proper procedures, to acquire necessary information to complete transaction.

Achievement Indicators: The learner:	Yes	No
1. Verified customer's phone number -	____	____
2. Picked up receiver and dialed number -	____	____
3. Promptly identified themselves to customer -	____	____
4. Explained purpose of call -	____	____
5. Confirmed information received or given -	____	____
6. Expressed appreciation to customer -	____	____
7. Closed conversation -	____	____
8. Replaced receiver -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 16

Task: Complete a service invoice, listing all the required information, to complete a transaction to the satisfaction of customer and management.

Achievement Indicators: The learner:	Yes	No
1. Wrote in customer's name, address and telephone number -	____	____
2. Wrote in model number, serial number, and make of TV set -	____	____
3. Itemized cost of replacement parts used -	____	____
4. Totalled cost of replacement parts -	____	____
5. Added appropriate tax to cost of parts -	____	____
6. Added service charges for work performed -	____	____
7. Added cost of parts, tax, and service charges for total bill -	____	____
8. Placed completed service ticket in ready file -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 17

Task: Present an invoice to a customer, using proper procedures, to collect for services.

Achievement Indicators: The learner:	Yes	No
1. Greeted customer -	____	____
2. Gave merchandise to customer -	____	____
3. Presented bill to customer -	____	____
4. Answered questions, complaints and/or objections -	____	____
5. Collected payment -	____	____
6. Made change, if necessary -	____	____
7. Marked bill paid -	____	____
8. Thanked customer for patronage -	____	____
9. Returned money and receipted invoice to shop -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 18

Task: Clean television cabinet, using necessary materials and hand tools to restore unit to original condition.

Achievement Indicators: The learner:	Yes	No
1. Obtained cleaning materials and clean, dry, soft cloth -	____	____
2. Applied cleaning material to cloth and wiped cabinet clean on top and sides -	____	____
3. Buffed cleaned areas with dry cloth -	____	____
4. Applied glass cleaner to glass and/or picture tube -	____	____
5. Wiped glass and/or picture tube clean -	____	____
6. Buffed cleaned glass and/or picture tube with clean, dry soft cloth -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 19

Task: Check all customer controls for proper operation, using necessary test equipment and hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Turned on TV set -	____	____
2. Observed picture and checked customer controls as follows:		
a. adjusted vertical hold control and checked to see if picture would roll up and down -	____	____
b. adjusted horizontal hold control and checked for stable syncronization -	____	____
c. adjusted color control and checked for volume variations -	____	____
d. adjusted color control and checked for color variations -	____	____
e. adjusted grey scale if necessary -	____	____
f. adjusted tint control and checked for color variations -	____	____
g. adjusted brightness control and checked for brightness variations -	____	____
h. adjusted contrast control and checked for contrast variations -	____	____
i. adjusted fine tuning control and checked for contrast variations -	____	____
j. checked age control -	____	____
k. checked auto-color control if necessary -	____	____
l. checked focus -	____	____
m. checked height, width, and linearity -	____	____
n. checked off-on switch -	____	____
3. Checked to see that all control adjustments produced a picture of peak quality -	____	____
4. Turned off TV set -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 20

Task: Adjust all television service controls using necessary test equipment and hand tools to achieve proper operation of unit.

Achievement Indicators:

The learner:	Yes	No
1. Plugged TV set into AC outlet -	____	____
2. Turned on set -	____	____
3. Observed picture with each of the following adjustments until quality picture was restored:		
a. adjusted AGC and noise control -	____	____
b. adjusted vertical centering, height and linerity -	____	____
c. adjusted high voltage -	____	____
d. adjusted focus -	____	____
e. adjusted black and white tracking -	____	____
f. adjusted color killer -	____	____
g. adjusted width and horizontal centering -	____	____
4. Turned off set -	____	____

Criteria: Competence in the task will be recognized when the acheivement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 21

Task: Prepare maintenance reports, using necessary data and equipment to achieve recommended level or reporting and recordkeeping.

Achievement Indicators: The learner:	Yes	No
1. Recorded name, address, phone number of customer -	____	____
2. Listed nature of the problem -	____	____
3. Described job performed -	____	____
4. Listed materials used -	____	____
5. Recorded any additional work needed -	____	____
6. Filed maintenance report as required -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 22

Task: Monitor a safety program using necessary materials to achieve a recognized level of worker safety.

Achievement Indicators: The learner:

	Yes	No
1. Inspected equipment for compliance to recommended safety procedures -	____	____
2. Inspected job site for compliance to recommended safety proceudres -	____	____
3. Inspected accident reports for compliance to accepted standards. -	____	____
4. Made necessary recommendations -	____	____
5. Recorded violations -	____	____
6. Discussed analysis with instructor -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 23

Task: Maintain required data records using necessary journals and material to achieve required level of accountability.

Achievement Indicators: The learner: Yes No

1. Planned record keeping procedure:
   a. organized a system for keeping necessary data - ____ ____
   b. gathered relevant data and forms - ____ ____
   c. organized a filing system - ____ ____
2. Recorded data:
   a. reviewed record forms - ____ ____
   b. recorded pertinent data in appropriate place on forms- ____ ____
   c. kept recorded data updated - ____ ____
   d. reviewed completed forms for accuracy - ____ ____
   e. filed recorded data appropriately - ____ ____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 24

Task: Analyze audio symptoms to isolate defective stage.

Achievement Indicators: The learner:

	Yes	No
1. Turned set on -	____	____
2. Analyzed quality of audio -	____	____
3. Removed back from set -	____	____
4. Positioned set for easy access to audio circuit -	____	____
5. Using proper test equipment, analyzed audio circuit with tests below until point of distorted or missing signal was isolated:*		
a. tested signal to grid of audio output tube or base of output transistor -	____	____
b. tested signal to grid of audio amplifier tube or base of amplifier transistor -	____	____
c. tested signal at input of audio detector stage -	____	____
d. tested signal at inputs of each sound IF tube or transistor -	____	____
6. Checked equipment performance -	____	____

*If signal is clear at one point and distorted or missing at the next point, the problem is localized between the point responding clear and the point respondent distorted or missing.

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the superviosr's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 25

Task: Clean/replace volume control using appropriate tools and equipment to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Turned set on -	____	____
2. Rotated volume control; if rotation caused static, cleaned control by:		
a. removing back from set -	____	____
b. spraying the contacts of volume control with degreaser or control cleaner -	____	____
c. rotating volume control from side to side -	____	____
3. If static did not disappear, replaced faulty volume control by:		
a. labeling wires and disconnecting from control -	____	____
b. removing volume control from mounting -	____	____
c. selecting correct replacement control -	____	____
d. replacing control on mounting -	____	____
e. reconnecting wires to correct terminals of replacement control -	____	____
f. checking audio for proper operation -	____	____
g. replacing back on set -	____	____
h. checking receiver operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 26

Task: Align sound IF section using appropriate tools and equipment to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned TV for easy access to audio IF circuit -	____	____
3. Located check points on schematic -	____	____
4. Connected equipment to TV set according to factory recommendations and/or specifications using isolation transformer -	____	____
5. Turned set on -	____	____
6. Adjusted sound coils according to specifications -	____	____
7. Disconnected equipment -	____	____
8. Checked sound on several channels -	____	____
9. Turned set off -	____	____
10. Replaced back on TV set -	____	____
11. Checked receiver operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 27

Task: Adjust color killer control using necessary test equipment and hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Turned on TV set -	____	____
2. Selected channel with no picture being transmitted -	____	____
3. Located color killer control -	____	____
4. Turned control counter clockwise until colored snow appears on screen -	____	____
5. Turned control clockwise until colored snow disappears -	____	____
6. Turned channel selector to station broadcasting a color program and checked for color -	____	____
7. Checked all channels for color -	____	____
8. Checked receiver operation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 28

Task: Repair the television ACC circuit using necessary test equipment and hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set* -	____	____
2. Positioned set for easy access to the ACC circuit -	____	____
3. Applied power to TV and turned set on -	____	____
4. Located test points on schematic -	____	____
5. Checked voltages and signals at all appropriate ACC test points -	____	____
6. Compared findings with specifications and discussed with instructor -	____	____
7. Replaced faulty components -	____	____
8. Made necessary adjustments -	____	____
9. Checked color quality -	____	____
10. Replaced back on TV -	____	____
11. Made final operational check -	____	____

*CAUTION: One side of the AC line may be connected to the chassis, use isolation transformer for servicing. Beware of the electrical shock hazard from high voltage and AC. Discharge high voltage.

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 29

Task:
Degauss color television set using necessary test equipment and hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Turned set on -	____	____
2. Made sure set was located in its permanent viewing position -	____	____
3. Plugged degaussing coil into AC outlet -	____	____
4. Stood in front of set and turned degaussing coil on -	____	____
5. Slowly rotated coil in a circular motion close to the front of the set -	____	____
6. Continued the circular motion:		
a. around one side of set -	____	____
b. across the top-	____	____
c. around the other side -	____	____
d. back to the front -	____	____
7. Stood in front of the set slowly moving the degaussing coil six feet back from set -	____	____
8. Rotated coil at right angle to the set and turned coil off -	____	____
9. Unplugged degaussing coil -	____	____
10. Made final operational check -	____	____
11. Turned set off -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 30

Task: Perform a complete color convergence using appropriate tools and equipment to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Plugged set into AC outlet using cheater cord -	____	____
3. Degaussed TV set -	____	____
4. Adjusted color purity -	____	____
5. Disconnected VHF antenna -	____	____
6. Connected color bar generator to antenna terminals -	____	____
7. Turned dial on color bar generator to dots -	____	____
8. Adjusted red, green, and blue convergence magnets for center convergence -	____	____
9. Followed manufactures specifications to converge -	____	____
10. Disconnected color bar generator -	____	____
11. Connected VHF antenna -	____	____
12. Turned off TV set -	____	____
13. Replaced back on TV set -	____	____
14. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 31

Task: Perform a complete purity set up using appropriate tools and equipment to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Plugged set into AC outlet using cheater cord -	____	____
3. Turned on TV set -	____	____
4. Degaussed TV set -	____	____
5. Loosened deflection yoke on neck of CRT -	____	____
6. Pulled yoke backward on CRT neck -	____	____
7. Turned the blue and green screen grid controls down to minimum -	____	____
8. Turned the red screen grid control up to obtain red raster -	____	____
9. Adjusted purity rings so that the purest red was centered on the screen -	____	____
10. Pushed deflection yoke forward until red filled out screen -	____	____
11. Tightened yoke in place -	____	____
12. Turned the red screen grid control down -	____	____
13. Turned the green screen grid control up -	____	____
14. Checked uniformity of green purity -	____	____
15. Turned green screen grid control down -	____	____
16. Turned blue screen grid control up -	____	____
17. Checked uniformity of blue purity -	____	____
18. Adjusted for gray scale tracking:		
a. turned brightness control up to about 80% of its maximum capacity -	____	____
b. adjusted red screen for dim raster -	____	____

The learner:	Yes	No
c. adjusted green screen for dim raster -	____	____
d. adjusted blue screen for dim raster -	____	____
e. turned brightness control up for maximum capacity and checked gray scale -	____	____
f. turned brightness control down to minimum raster and checked gray scale -	____	____
19. Turned off TV set -	____	____
20. Replaced back on TV set -	____	____
21. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 32

Task: Analyze picture problems from video display using necessary hand tools to restore unit to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Turned set on -	____	____
2. Observed picture for :		
a. color -	____	____
b. color SYNC -	____	____
c. vertical SYNC -	____	____
d. horizontal SYNC -	____	____
e. vertical deflection -	____	____
f. horizontal deflection -	____	____
g. snow -	____	____
h. video on high and low channels -	____	____
i. focus -	____	____
j. raster -	____	____
k. high voltage -	____	____
l. black and white tracking -	____	____
3. Analyzed problem with set -	____	____
4. Discussed analysis with instructor -	____	____
5. Turned set off -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 33

Task: Clean VHF tuner using approved cleaner/lubricants and necessary hand tools to restore tuner to proper operation.

Achievement Indicators: The learner:

	Yes	No
1. Removed the back from TV set -	____	____
2. Positioned the set for easy access to the tuner -	____	____
3. Removed shielding/dust cover from VHF tuner -	____	____
4. Sprayed tuner contacts with cleaner/lubricant while rotating station selector knob -	____	____
5. Replaced shielding/dust cover on VHF tuner -	____	____
6. Replaced back on TV set -	____	____
7. Inserted power cord and turned on TV set -	____	____
8. Made final operational check -	____	____
9. Turned off TV set -	____	____

Criteria: Competence in the task will be recognzied when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Television Maintanence and Servicing	**Duty No.** D
	Task No. 34

Task: Replace VHF tuner using necessary test equipment and proper hand tools to restore TV set to proper operation.

Achievement Indicators: The learner:	Yes	No
1. Removed back from TV set -	____	____
2. Positioned the set for easy access to tuner -	____	____
3. Unbolted tuner from chassis -	____	____
4. Marked wires and removed tuner from chassis -	____	____
5. Re-installed and bolted tuner to chassis -	____	____
6. Re-connected wires to tuner -	____	____
7. Turned on TV set -	____	____
8. Checked all channels for proper operation -	____	____
9. Turned off TV set -	____	____
10. Replaced back on TV set -	____	____
11. Made final operational check -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed to the supervisor's satisfaction.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 1

Task: Investigate employment information using sources of employment information to identify employment opportunities.

Achievement Indicators: The learner:	Yes	No
1. Developed a list of the prime sources of information concerning opportunities for employment -	____	____
2. Described special procedures, if any, required to utilize services, information, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 2

Task: Identify job requirements using health, physical, legal, education, and other occupational information to determine the requirements of an occupation.

Achievement Indicators: The learner:

	Yes	No
1. Listed the significant requirements (health, physical, legal, education, etc.) of the appropriate occupation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 3

Task: Acquire wage information using available resources to determine the approximate entry wages, general wage range, and significant fringe benefits for an occupation.

Achievement Indicators: The learner:	Yes	No
1. Listed the approximate entry wages, general wage range, and significant fringe benefits for the appropriate occupation -	____	____
2. Compared these wages and fringe benefits with other selected occupations -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 4

Task: Identify significant non-wage job characteristics using available resources to determine shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment and other significant job factors.

Achievement Indicators: The learner:	Yes	No
1. Listed and described the significant non-wage characteristics (e.g., shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment, etc.) -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 5

Task: Explore employment opportunities using available resources to describe local, regional, and national employment opportunities for an occupation.

Achievement Indicators: The learner:	Yes	No
1. Described the local, regional, and national employment opportunities for the appropriate occupation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 6

Task: Analyze career ladder using available resources to describe job progression in an occupation.

Achievement Indicators: The learner:

	Yes	No
1. Described the career ladder associated with the appropriate occupational area -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 7

Task: Identify personal criteria with information about available alternatives using a decision-making situation and procedures and skills in decision-making to choose a job, further training or other alternatives.

Achievement Indicators: The learner:	Yes	No
1. Compared personal criteria with information about a job, further training or other alternatives -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 8

Task: Prepare a resume using personal information to apply for a job.

Achievement Indicators: The learner:	Yes	No
1. Prepared a resume -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 9

Task: Write a letter of application using personal notes to apply/inquire about a job.

Achievement Indicators: The learner:

	Yes	No
1. Wrote a letter of application/inquiry -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 10

Task: Complete a job application using personal notes to apply for a job.

Achievement Indicators: The learner:	Yes	No
1. Completed a job application -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 11

Task: Demonstrate appropriate dress using a knowledge of job requirements to comply with standards of on-the-job dress and grooming.

Achievement Indicators: The learner:

	Yes	No
1. Described and/or dressed in the attire of the appropriate occupational area, including:		
a. grooming -	____	____
b. required health and safety equipment -	____	____
c. uniforms -	____	____
d. other _____ -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 12

Task: Complete a job interview using communication and interpersonal skills to become employed.

Achievement Indicators: The learner:	Yes	No
1. Described and/or demonstrated appropriate characteristics for job applicants including:		
a. attire -	____	____
b. grooming -	____	____
c. conduct during the interview -	____	____
2. Described and/or demonstrated the interview process -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 13

Task: Describe personal criteria using references to identify acceptable job offers.

Achievement Indicators: The learner:

	Yes	No
1. Listed personal criteria (financial, social, etc.) which described a job offer -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 14

Task: Demonstrate interpersonal skills to achieve successful relationships with others.

Achievement Indicators: The learner:	Yes	No
1. Identified probable causes for conflicts and at least one possible action to relieve the conflict -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 15

Task: Identify source of continuing education for an occupation using available resources to identify career ladder alternatives.

Achievement Indicators: The learner:	Yes	No
1. Described the types and sources of related continuing education for the appropriate occupation and/or advancement within the career ladder associated with the occupation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** E
	Task No. 16

Task: Describe job termination procedures using a knowledge of the occupational area to leave a particular job.

Achievement Indicators: The learner:	Yes	No
1. Described procedures and practices for terminating a job -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

COMMUNICATION ELECTRONICS
EQUIPMENT LIST

1. Pliers, Longnose
2. Oscilloscope, Dual Trace 15 MHz
3. Screwdrivers, Flat Blade, Assorted
4. Wrench, Allen, Assorted
5. Crimper, Terminal
6. Pliers, Diagonal
7. Solder, 40/60
8. Wrench, Adjustable
9. Drill, Electric
10. Strippers, Wire
11. Desoldering Tool
12. Pliers, Combination
13. Clamps, Alligator, Assorted
14. Screwdriver, Phillips
15. Glasses, Safety
16. Test Leads
17. Screw driver, Offset
18. Drill Bits, #80 to 3/8"
19. Counter, Frequency, Minimum range of 100 MHz
20. Screwdriver, Wedgetite
21. Monitor, Communications rance to 1 GHz
22. Flashlight
23. Wrench, End, Set 1/4" to 13/16" by 16ths
24. Wrench, Socket, 1/4" Drive

25. Hammer, Ballpeen
26. Multimeter, Digital
27. Pencil, Soldering
28. Hacksaw, Adjustable
29. Files, Set, Mill (6" to 12")
30. Alignment Tools
31. Cables, Adapter
32. Gun, Soldering, 100 Watt
33. Nutdriver, Hollow Shaft, Set 6/32" to 18/32"
34. Glass, Magnifying
35. Headset, Earphones and Microphone
36. Lamp, Magnifying, Bench
37. Multimeter, Analog (solid state of VTVM)
38. Vise, Machinists, Swivel Base, Table
39. Screwdriver, Offset Phillips
40. Pliers, Snapring
41. Power Supply $\pm$ 20V, 5V 1.5 amp
42. Sinks, Heat
43. Kit, First Aid
44. Puller, Fuse
45. Vacuum Cleaner, Hand Held, Small Attachments
46. Drill, Hand
47. Mirrors, Small
48. Generator, Fuction (Sine, Sawtooth, and Square Wave)
49. Generator, Pulse

50. Probe, High Voltage
51. Punches, Set (Center, Pin, Prick)
52. Nibbling Tools
53. Tap and Die Set, Electricians
54. Brush, Wire
55. Tweezers
56. Brush, Point (Small)
57. Knife Set, Exacto
58. Drill Press, Bench Model, 15", Slow Speed
59. Wrenches, Socket, Metric, 1/4" Drive Set
60. Punches, Chassis, Round Set
61. Snips, Tin, 6" or Smaller
62. Test Jig, Television
63. Reamer, Hand, 1/8" Tip, 5 1/2" Long
64. Box, Substitution, Resistor and Capacitor
65. Bridge, Wheatstone
66. Generator, R-F with minimum of 2.5 microvolts output
67. Meter, Watt
68. Rust Remover/Preserver
69. Checker, Capacitor
70. Puller, Tube
71. Grinder, 6", 1/2 HP
72. Micrometer
73. Probe, R-F
74. Meter, Distortion

75. Gun, Rivet
76. Heater, Transistor
77. Scope, Cector, Cual Trace
78. Meter, Frequency Rance 1 GHz
79. Tester, Tube
80. Chisel, Cold, Set
81. Straightener, Tube Pin
81. Claculator, Programmable
82. Calipers, 6" or Smaller
83. Checkers, Module
84. Marker Adder
85. Bridge, SWR H.F.
86. Bridge, SWR V.H.F.
87. Coil, Degaussing
89. Tracer, Transistor Curve
90. Filter, Universal Tuning Range to 60 KHZ
91. Tester, Transistor/FET with Dynaflex Probe
92. Recorder, X-Y
93. Vector Board and Clip
94. Simulator, Marine Transponder
95. Simulator, Automatic Direction Finding (AGF)
96. Meter, Field Strength
97. Strobe Disc
98. Power Supply, Battery Eliminator, 30 AMP, 12V
99. Power Supply 6V, 12V, 3 AMPS
100. Stand, Turntable Repair

101. Tester, Mircowave

102. Awl

103. Box, Bias

104. Meter, Grid Dip

105. Carts, Equipment

106. Generator, Stereo, Multiplex

107. Analyzer, Logic

108. Logic Probe

109. Spectrum Analyzer (RF) Range 1 GHz

110. Logic Clip

111. Logic Pulser

112. Modulation Scope

113. Tuned Cavities (RF)

114. Load, Dummy HF

115. Load, Dummy VHF

116. Deviation Monitor

117. Isolation Transformer

118. Diagnostic Tester

119. Signature Analyzer

120. Experimental Board

121. Wire Wrap Gun

122. Cable Stripper

123. Digital Display Scope, 16 Trace

124. Pulse Counter

125. Pulse Trap

STUDENT ACHIEVEMENT RECORD

COMMUNICATION ELECTRONICS

STUDENT _____

INSTRUCTIONS:

Mark each student's level of competence according to the following guide:

LEVEL	GUIDE
1	Student has been exposed to task
2	Task accomplished with assistance
3	Task accomplished to criteria by student
4	Ability to teach or demonstrate the task to others

TASK	LEVEL	DATE
A. MAINTAINING COMMUNICATIONS DEVICES.		
1. Adjust/align a transmitter output.		
2. Align a RF oscillator.		
3. Align frequency multiplier stage.		
4. Align a RF driver stage.		
5. Align a RF ouptut amplifier.		
6. Align an IF stage.		
7. Align a FM discriminator stage.		
8. Clean potentiometer controls.		
9. Clean/lubricate all mechanical drive components.		
10. Clean air filters.		
11. Clean chassis.		
12. Clean circulation fans.		
13. Adjust appropriate section of a modulator stage.		
14. Adjust circuit supply voltages.		

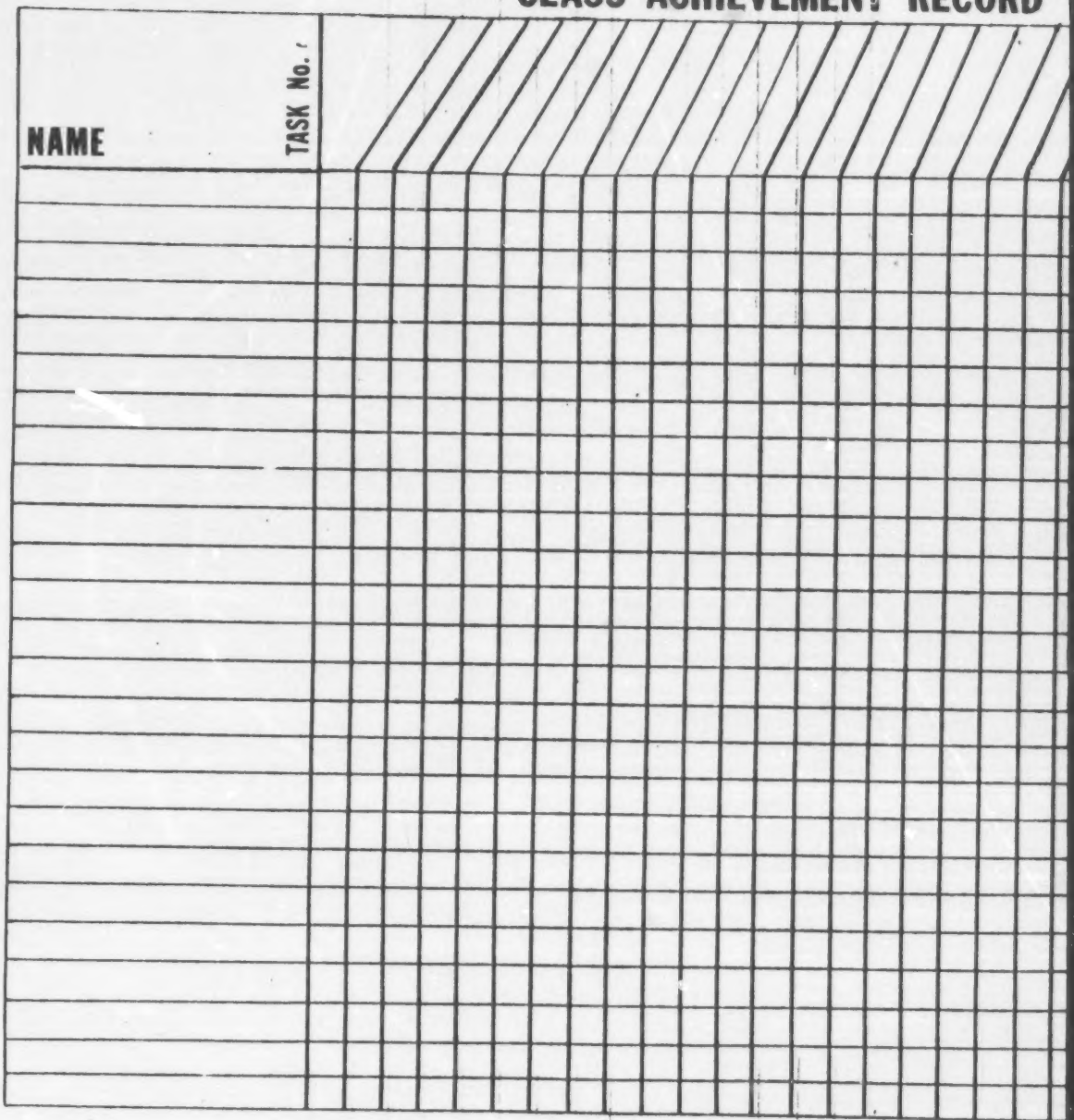
TASK	LEVEL	DATE
A. MAINTAINING COMMUNICATIONS DEVICES (continued)		
15. Align a Monostable IC Circuit for proper delay time.		
16. Adjust/align, HF, VHF, UHF antenna.		
B. DESIGNING EQUIPMENT AND CIRCUITRY		
1. Construct a transistor electronic circuit from a schematic.		
2. Design a digital logic truth table.		
3. Design and construct a digital logic circuit.		
4. Design and construct an I.C. operational amplifier circuit.		
C. SERVICING COMMUNICATIONS DEVICES		
1. Test and replace voltage input components to a transmitter or receiver.		
2. Test and replace an integrated circuit (IC) chip used in an RF oscillator.		
3. Test and replace an integrated circuit chip used in a frequency multiplier.		
4. Test and replace an integrated circuit chip used in a modulator.		
5. Test and replace an integrated circuit chip used in a Phase-Lock Loop Circuit.		
6. Test and replace an integrated circuit digital chip of the 7400 series family.		
7. Test and replace a C-MOS integrated circuit chip utilized in a digital circuit.		
8. Test and replace a digital display segment.		
9. Test and replace a CRT deflection yoke.		
10. Test and replace a microphone.		
11. Test and replace a monostable integrated circuit chip.		
12. Test and replace a photo-electric relay.		
13. Test and replace Selsyn Unit of a Servomechanism.		

TASK	LEVEL	DATE
C. SERVICING COMMUNICATIONS DEVICES (continued)		
14. Test and replace a magnetic tape head.		
15. Test and replace a Transducer.		
16. Test and replace UHF coaxial connectors.		
17. Repair audio output transformer.		
18. Repair change switch.		
19. Repair speaker.		
20. Replace auto radios.		
21. Check/replace volume control.		
22. Check/replace tuning capacitor.		
23. Check/replace electron tubes.		
24. Check/repair/replace electron tube sockets.		
25. Check/repair/replace transistor sockets.		
26. Check/replace transistors.		
27. Check/replace tone control.		
28. Check/repair/replace earphone/earplug.		
29. Adjust record player stylus pressures.		
30. Clean/lubricate record changer.		
31. Operate equipment.		
32. Check/replace on-off switch.		
34. Check/replace capacitors.		
35. Check/replace IF transformer.		
36. Check and replace dial cord.		
37. Check/repair/replace case or cabinet.		
38. Check/replace battery holders.		
39. Check/replace batteries.		
40. Check/replace resistors.		
D. TELEVISION MAINTENANCE AND SERVICING		
1. Analyze waveforms of keying pulse to blanker.		
2. Analyze waveforms of gating pulse to burst amplifier.		
3. Analyze waveforms of red domodulator.		
4. Analyze output waveform of 3.58 MHZ oscillator.		
5. Analyze output waveform of green domodulator.		

TASK	LEVEL	DATE
D. TELEVISION MAINTENANCE AND SERVICING (continued)		
6. Analyze output waveform of blue domodulator.		
7. Analyze waveform of bandpass amplifier.		
8. Analyze input waveform to phase detector.		
9. Analyze input waveform to color demodulators.		
10. Analyze color problems by viewing a color television program.		
11. Analyze a color problem.		
12. Analyze burst ouput waveform.		
13. Remove the television chassis from cabinet.		
14. Pick-up/deliver a television set.		
15. Call a customer.		
16. Complete a service invoice.		
17. Present an invoice to a customer.		
18. Clean television cabinet.		
19. Check all customer controls.		
20. Adjust all television service controls.		
21. Prepare maintenance reports.		
22. Monitor a safety program.		
23. Maintain required data records.		
24. Analyze audio symptoms to isolate defective stage.		
25. Clean/replace volume control.		
26. Align sound IF section.		
27. Adjust color killer control.		
28. Repair the television ACC circuit.		
29. Degauss color television set.		
30. Perform a complete color convergence.		
31. Perform a complete purity set up.		
32. Analyze picture problems from video display.		
33. Clean VHF tuner.		
34. Replace VHF tuner.		

TASK	LEVEL	DATE
E. USING EMPLOYABILITY SKILLS		
1. Investigate employment information.		
2. Identify job requirements.		
3. Acquire wage information.		
4. Identify significant non-wage job characteristics.		
5. Explore employment opportunities.		
6. Analyze career ladder.		
7. Identify personal criteria with information about available alternatives.		
8. Prepare a resume.		
9. Write a letter of application.		
10. Complete a job application.		
11. Demonstrate appropriate dress.		
12. Complete a job interview.		
13. Describe personal criteria.		
14. Demonstrate interpersonal skills to achieve successful relationships with others.		
15. Identify source of continuing education for an occupation.		
16. Describe job termination procedures.		

CLASS ACHIEVEMENT RECORD



GLOSSARY OF VOCATIONAL TERMS

Advisory Committee. An appointed group of concerned citizens and educators representative of the occupations for which training is given in the local school, organized for the purpose of helping to plan vocational programs and offering counsel on their development and operation.

Apprenticeship. An instructional program in which the learner works directly under a qualified craft worker to learn a trade.

Career Development. A lifelong process involving a series of experiences, decisions, and interactions, which, taken cumulatively, results in the formulation of a viable self concept and provides the means through which that self concept can be implemented both vocationally and avocationally.

Career Education. The total effort of public education and the community to help all individuals become familiar with the values of a work-oriented society, to integrate such values into their personal value systems, and to implement those values into their lives in such a way that work becomes possible, meaningful, and satisfying to each individual.

Career Interest. The student's decision to pursue a job description or cluster within a vocational education program area.

Cluster of Occupations. Occupations for which a common core of instruction can prepare, as for example automotive trades which prepares for such occupations as auto mechanic, auto body repairman, automotive services, auto inspector, and brake adjuster.

Completion. That statistic which describes individuals, including early leavers who have achieved their immediate objectives in preparation for entry or progressing in an occupational field and have left the vocational education program.

Cooperative Vocational Education. An instructional plan which combines learning experiences gained through regularly scheduled supervised employment in the community and vocationally oriented in-school instruction.

Coordinator (Cooperative Education). A member of a local school staff who teaches occupational and related subject content to students preparing for employment and coordinates the efforts of all helpful agencies which can assist in a training program designed to meet the needs of learners in a cooperative vocational education program. At times the coordinator may have varying degrees of responsibility in adult vocational education.

Course. A defined segment of a program.

Course Outline. An outline of subject matter to be presented or learning experiences planned for a course.

Course of Study. A guide prepared by administrators, supervisors, and teachers of a particular school or school system as an aid to teaching a given subject or area of study. More detailed than a course outline and includes statement of methods, materials, and equipment needed.

Curriculum. A sequence of educational and skill development experiences designed to accomplish a particular purpose. The curriculum for a program of vocational/technical education is designed to prepare an individual for entry, promotion, or upgrading in a specific occupation or cluster of occupations. (See definition of Cluster of Occupations.)

Disability. An injury or illness, temporary or permanent, which prevents workers from carrying on their usual occupations. A disability retirement is retirement because of physical inability to perform the job.

Disadvantaged. Disadvantaged persons are those who have academic, socioeconomic, cultural, or other handicaps that prevent them from succeeding in a regular vocational program designed for persons without such handicaps, and who for that reason require specially-designed educational programs and related services, or both, in order for them to benefit from a vocational program.

Discharge. Dismissal of a worker from employment. The term implies discipline for unsatisfactory performance and thus is usually limited to dismissals for such reasons as insubordination, absenteeism, or inefficiency.

Discrimination. Unequal treatment of workers in hiring, employment, pay or conditions of work because of race, national origin, creed, color, sex, age, union memebership activity, or any other characteristics not related to ability or job performance. Discrimination is prohibited by Federal, State, and local laws.

Duty. A large segment of work performed by an individual. It is one of the distinct major activities involved in the work performed, and it is composed of several related tasks.

Employer. General term for any individual, corporation, or other operating group which hires workers. The term "employer" and "management" are often used interchangeably.

Evaluation. A measuring or assessing of effectiveness. An on-going process by which effectiveness and progress are determined, used to guide change and offer directions for program modification and operation.

Exploratory Experiences. Those experiences in a variety of occupations, which help the students identify job traits in relation to their abilities and characteristics, and to assist them in making realistic and appropriate occupational choices.

Follow-Up Report. Usually a composite short-term or long-term report of former students indicating their present employment status or other present commitments (education, military, homemaking). More sophisticated follow-up studies seek to assess the effectiveness of the cooperative training experience to the student's present situation. Individual follow-up information is usually maintained in a student's record file.

Follow-Up Study. A study of the occupational status and progress of former students, as a means of evaluating effectiveness of the school's program of occupational preparation, of improving such preparation, and/or of determining needs of former students for further services.

General Advisory Committee. A committee that advises an institution as to its vocational/technical education activities overall. (See also; Occupational Advisory Committee).

Guidelines. The means by which significant characteristics in the evaluation of an institution or program are identified or measured.

Handicapped. Handicapped persons are those who are mentally-retarded, hard of hearing, deaf, speech-impaired, visually-handicapped, seriously emotionally disturbed, crippled, or other health-impaired persons who, by reason of their handicapping conditions, cannot succeed in a regular vocational or consumer and homemaking education program without special educational assistance, or who require a modified vocational program.

Hazardous Occupation. An occupation designated by State of Michigan and/or federal law to be considered dangerous to the health and well-being of minors.

Individualized Instruction. That type of instruction that provides techniques through which the teacher can work directly with individual students, as opposed to group instruction.

Inservice Teacher Education. All educational, and professional activities contributing to professional competencies which a person engages in after becoming employed, such as: formal course work, work experience, internships, practicums, seminars, and independent-individualized studies.

Internship. Student performs in approved job situation. Usually paid and given credit for the work. In-school instruction usually given before the work period and seldom tied in directly with job experiences. Typically one semester or more. Internship is a term used for collegiate experiences.

Job. The duties and tasks actually performed by a specific individual.

Job Analysis. See: Occupational Analysis.

Job Description. A written statement listing the elements of a particular job or occupation. The statement may include the purpose of the job, duties, equipment used, qualifications, training requirements, physical and mental demands, and working conditions.

Job Placement. Those organized activities performed by a guidance counselor or job placement coordinator designed to assist students in locating employment.

Job Type. A group of jobs that are composed of essentially the same significant duties and tasks.

Learning Resources. All textbooks, reference materials, equipment, supplies and other items and materials needed for successful achievement of learning objectives.

Manpower. People available to perform needed labor.

Management System. A technique employed to provide an organized method of accomplishing stated mission, goals, and objectives.

Minimum Wage. The lowest rate of pay, established by law or through collective bargaining, at which covered workers may be employed. The minimum wage is usually expressed as an hourly rate.

M.O.I.S. Michigan Occupational Information System.

National Occupational Competency Exam. A written and a performance exam developed by the National Occupational Competency Testing Institute, sponsored by T&I Education, for the purpose of determining the degree of competency that one has in a specific trade and industrial occupation.

Occupational Analysis. A technique for finding out what a worker in a specific occupation does and what he needs to know to perform his job efficiently, which is then used as a means of determining the teaching content in an occupational preparatory program.

Occupational Advisory Committee. A committee advising as to a program preparing for a particular occupation or cluster of occupations.

Occupational Competence. Includes technical knowledge and skills; manipulative skills; communication skills; human relations skills; work habits; and the ability to reason, to solve problems, to think independently, and to make judgments necessary for satisfactory employment in the occupation.

Occupational Field. A group of recognized occupations having many similarities, including the following characteristics in common; the type of work performed; the basic aptitudes, and the acquired knowledge and training required; the tools, machines, instruments, and other equipment used; and the basic materials used.

Occupational Objective. An occupational goal, selected by the student, the attainment of which is the purpose for his/her vocational instruction.

On-The-Job Training. Instruction in the performance of a sequentially planned task given a student-learner by the employer during the usual working hours of the occupation. Learning experiences at the training station comprises both the application of the theory of and the technical skill aspects of the learning situation, and/or the proper character, attitude and personality development of the student-learner as general goals of the training situation at the training station.

Occupational Information. Systematically organized data used by guidance personnel and others for the purpose of helping persons make a vocational choice. Material concerns the nature of the work, duties, responsibilities, and compensations involved in the several vocations, including information about employment outlook, promotional opportunities, and entrance requirements.

Occupational Objective. A specific recognized occupational goal, selected by the student, the attainment of which is the purpose of his vocational instruction. Also called: Career Objective.

Placement Coordinator. A person who provides local leadership to plan and initiate placement services.

Placement Services or Placement Activities. A series of coordinated activities for students planning further education or seeking part-time or full-time employment either for additional education, for on-the-job training or for earning a living.

Preparatory Instruction. Instruction preparing students for full or part-time employment. Also serves to prepare students to enter and advance in an occupation. Also serves to equip workers with new or different skills demanded by technological changes.

Preparatory Program. A preparatory program provides vocational instruction designed to prepare individuals for gainful employment as semi-skilled or skilled workers or technicians or semi-professionals in recognized occupations. Preparatory programs are provided in the school laboratory/classroom.

Professional Organizations. Groups of personnel interested in and working toward the improvement, advancement, and upgrading of activities, not only in their specific field, but also of activities in related fields of endeavor such as the American Vocational Association.

Program (Vocational Education). "Vocational program" means laboratory, simulation or instruction based upon individually designed learning experiences in a vocational subject preparing the student for competencies required in a recognized occupation coded in accordance with the most recent vocational education listing of programs by the United States Department of Education.

Related Vocational Instruction. In-school courses specifically designed to improve personal and social skills, provide needed basic education (remedial), and/or develop relevant occupational skills and knowledges. The course should be regularly scheduled, should complement the learning experiences at the training station, and should be planned and developed to meet the specific needs of the individual student. The content of this course should consist of the theory of the occupational skill, the specific related information, and the general related instruction necessary to achieve personal success in the world of work.

Resources. People, money and materials available to an institution in carrying out its purposes.

School Community. The total community from which the school draws students, support, and resources.

School District. An administrative unit at the local level which exists primarily to operate public schools or to contract for public school services. Normally, taxes can be levied by such units for school purposes. These units may or may not be coterminous with county, city or town boundaries. This term is used synonymously with the term "local basic administrative unit."

Skills. The acquisition of knowledge, ability, proficiency, dexterity and technical expertness that enables one to develop a learned power of doing a thing completely.

State Plan. The document submitted by the state board for vocational education to the U. S. Office of Education describing the state's vocational education program. Includes policies followed by the state in maintaining, extending, and implementing existing programs and establishing new programs to meet the intent of the Vocational Education Acts. Prerequisite for receiving federal funds under the Acts.

Survey, Community. A fact-finding study of socioeconomic conditions and resources, community agencies, industries, business, farming, institutional practices, problems and practices of families, etc., as they exist at a given time in a given community. It is generally used by the school as a guide in revising school offerings to meet local needs.

Survey, Occupational. A form of occupational census, taken by personnel trained to determine the number of qualified employees in a designated occupation in a specified geographic or economic area; and to evaluate the need for increasing or limiting the numbers available for employment in the occupations surveyed.

Task. A unit of worker activity that is intermediate in specificity between a function and a procedural work step or action. It is a discrete unit of work performed by an individual; that is, the unit usually has a definite beginning and ending, and it is performed within a limited period of time.

Task Analysis. A detailed listing of skills necessary to perform a clearly defined, specific job, organized into a logical sequence and which may be used for teaching employment, or classification purposes.

Task Inventory. An instrument used for conducting an occupational survey. It consists of items of identification and background information and a list of appropriate duty and task statements.

Teacher-Coordinator (Cooperative Vocational Education). A member of the local school staff who teaches technical and related subject matter to students preparing for employment and coordinates classroom instruction (related classroom) with learning activities at the training station. The coordinator is also responsible for the evaluation procedures of the program.

Trade and Industrial. Instruction planned to develop basic manipulative skills, safety practices, judgments, technical knowledge, and related occupational information for the purpose of preparing persons for initial employment in the trades and industrial occupations.

Training Agreement. A statement of fundamental agreements regarding the participation of a student in a work environment. Initiated by the school, the agreement reflects a voluntary and cooperative commitment on the part of the coordinator, employer, student, and parents/guardians.

Training Plan. A format for delineating, for each student, the learning experiences and tasks to be undertaken at the training station, often paralleled with classroom units of instruction. The training plan, cooperatively determined, usually becomes a part of the training agreement.

Training Station. The establishment providing learning experience for the student-learner.

VICA. Vocational Industrial Clubs of America. The youth organization for students at secondary and post-secondary levels who are in preparation for employment in trade & industrial occupations.

Vocational Education. Organized educational programs, services, and activities which are directly related to the preparation of individuals for paid or unpaid employment, or for additional preparation for a career requiring other than a baccalaureate or advanced degree.

Vocational Student Organizations. Organizations for student-learners that complement the vocational education program. Recognized student-learner organizations for vocational education are: DECA, Distributive Education Clubs of America; FFA, Future Farmers of America; FHA-HERO, Future Homemakers of America-Home Economics Related Occupations; HOSA, Health Occupations Students of America; OEA, Office Education Association at the post-secondary level in Michigan and BOEC, Business Office Education Clubs at the secondary level; VICA, Vocational Industrial Clubs of America. Organizations for students enrolled in vocational education programs, with national, state and local units, the activities of which are an integral part of the instructional program.

Work Experience and Career Exploration (WECEP). Program emphasizes learning experiences at the training station based on individual needs and provides learning experiences for those students whose needs cannot be served by regular cooperative education programs.

Work Experience Program. Students perform tasks of the actual job and may or may not be paid. Typically engaged in for general education values, including exploratory. Usually one semester or less. Limited school supervision; usually no related class.

Work Observation Program. Student observes work, does not perform tasks except to understand them. Unpaid. Plan is usually few weeks in length and may be tied in with a class in which occupational information is discussed.

Work-Study Program. A federal program designed to provide a vocational education student with employment in the public sector and supplemental income while attending school. The vocational program does not necessarily have to be related to the job.

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